THE
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ELECTRO-PLATERS REVIEW

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Electroplaters Will Meet in Detroit

Plans for the Seventeenth Annual Convention of the American Electroplaters' Society in Detroit, Mich., July 8-11, 1929. Detroit, a Great Plating Center

By F. J. HUNTLEY
Detroit, Mich.

WRITTEN ESPECIALLY FOR THE METAL INDUSTRY

THE seventeenth annual convention of the American Platers' Society opens at the Hotel Statler in Detroit, Mich., July 8, and continues until July 11—four days of extraordinary opportunity for every one interested in plating.

It is particularly appropriate that this great gathering should be held in Detroit if for no other reason than that it is one of the greatest plating centers to be found anywhere in the United States. And this naturally leads up to the question. "Why is it that Detroit stands out so prominently in this field?"

The answer is easy enough, of course—the automobile, the airplane, the refrigeration and the stove industries. Then there are any number of lesser enterprises that are helping to sustain the plating industry. With its numerous plants, both large and small, a more attractive place for holding this national gathering could not have been selected. Also with so many large plants fully and partially automatically equipped for doing work on large production, it is difficult to point to the one in Detroit that really is the most outstanding. But in a general way it is needless to say that those particularly connected with the motor car industry take the lead.

Hotel Statler, Detroit, Mich.

A local committee has already made arrangements for delegates to visit and inspect many of the large plants while they are under production and it might be added that all of them will be operating at capacity while the visitors are in the city for the annual convention.

Probably the most outstanding development in the industry during the last five or six years is that of chromium plating. Detroit probably, more than any other center is responsible for much of the progress made in this particular work.

For years the motor car manufacturers were seeking a more durable plating—something that would stand up under weather conditions and keep its brilliancy. Among the most persistent experimentors was the General Motors of Detroit. The first experiments of this organization with this new type of plating was at its Oldsmobile plant in Lansing. Work was continued at this point for three years or more before it really was brought to perfection and it became a permanent finish for Oldsmobile cars. And then, as if by magic, chromium plating was adopted by other motor car companies—not only in Detroit, but in other parts of America. And now this wonderful bright deposit over nickel plating has arrived and Detroit, where this national platers' convention is going to be held from July 8 to 11, is the center of this particular branch of the electroplating industry.

The Educational Committee of the platers' organization has arranged to have some of the best technical and practical men in the profession prepare papers for the technical sessions. These will be discussed and a world

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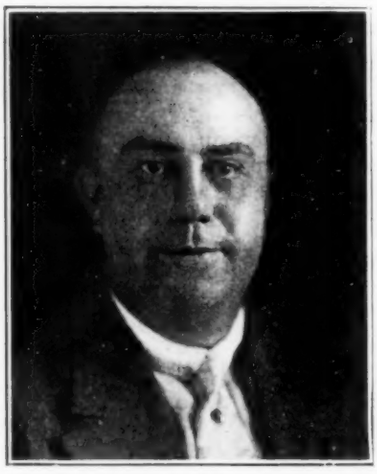

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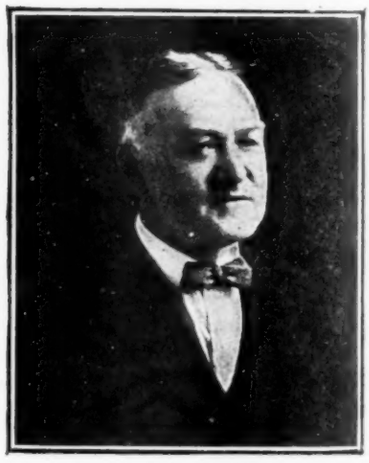

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General Chairman,
Convention Committee

of knowledge on chromium be available to all who attend the meetings.

E. G. Lovering chairman, of the convention committee in an interview with a representative of THE METAL INDUSTRY, had the following to say regarding the progress of plating which will be so intensively discussed in the convention sessions:

Visits to Detroit's Great Plating Plants

"The out of town visitor coming to Detroit usually is amazed at the large number of open air sales lots where second hand cars are sold. He sees them on every vacant lot or space available, as the demand for used cars is high and this open air car market is one of the means utilized by automobile companies to resell the cars taken in trade. We were passing recently one of these used car markets whose stock consisted of several cars of rare old vintage, with the price marked in large type on the windshield. They had seen better days, and had stood so long out in the open exposed to the elements, that the tires were giving up under the strain. Suddenly we stopped; something out of the ordinary had caught our eyes. There among that antediluvian collection was an

Packard Motor Company Plant

old car with a chromium plated radiator shell. There it stood in all its splendor like a rose in a garden of weeds, still holding its own. It was an Oldsmobile of 1925. If George Fry could see that example of the first endeavor to chrome plate radiator shells!

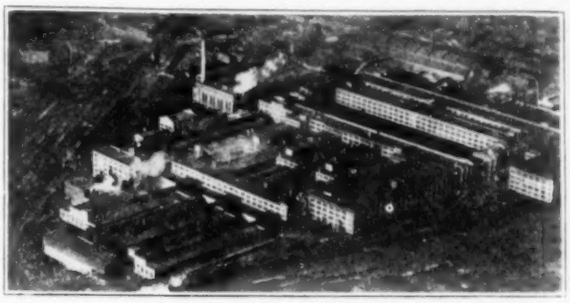
Chrysler, Jefferson Avenue Plant

"We turned away and walked toward the curb watching the newer automobiles speed by, up and down the Avenue. What a change! Nearly every car that passed had chrome plated parts.

Chevrolet Motor Company

"Where do they do all this chromium plating that we see on all these cars? I thought chromium plating was hard."

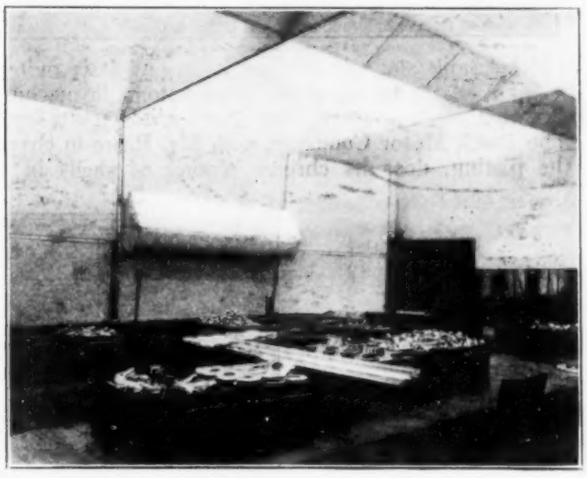
"Maybe so but the platers of today evidently have overcome some of the difficulties and are turning it out in large production. But there still must be a lot of research carried on; standards developed; thickness of deposit studied; the best metal found to deposit on the base metal previous to chome plating; the best deposits to use on brass and steel to stand service conditions.



Cadillac Motor Company

"The best means to overcome the many conditions that are detrimental to the life of chromium plating, will be thoroughly discussed at the Detroit Convention.

"How would you like to visit some of the shops where they are plating in mass production? First we will go out to the Chrysler plant with Mr. Bowlus, the electrical engineer and Charles Marker, the foreman plater. The latter is chairman of the exhibit committee of plated work for the convention. They will be glad to show what they have accomplished in plating Chrysler auto parts. The visitors will see there 12 large chrome plating tanks, 500 gallons each; an individual 1500 Ampere generator set connected to each tank making a battery of 12 motor-generator sets all in line. The operator of each tank has his own generator, the current for the tank being controlled by the field rheostat which is placed at the side of the chrome tank where the operator can easily control the current. This unit is capable of chrome plating 1000 radiator shells a day. The shells are first copper plated and buffed, then nickel plated and buffed, and finally chrome plated.



Chromium Plating Inspection Booth, Packard Motor Company

"We will next visit the Graham-Paige plant, and see how Wilson White gets out his mass production on shells

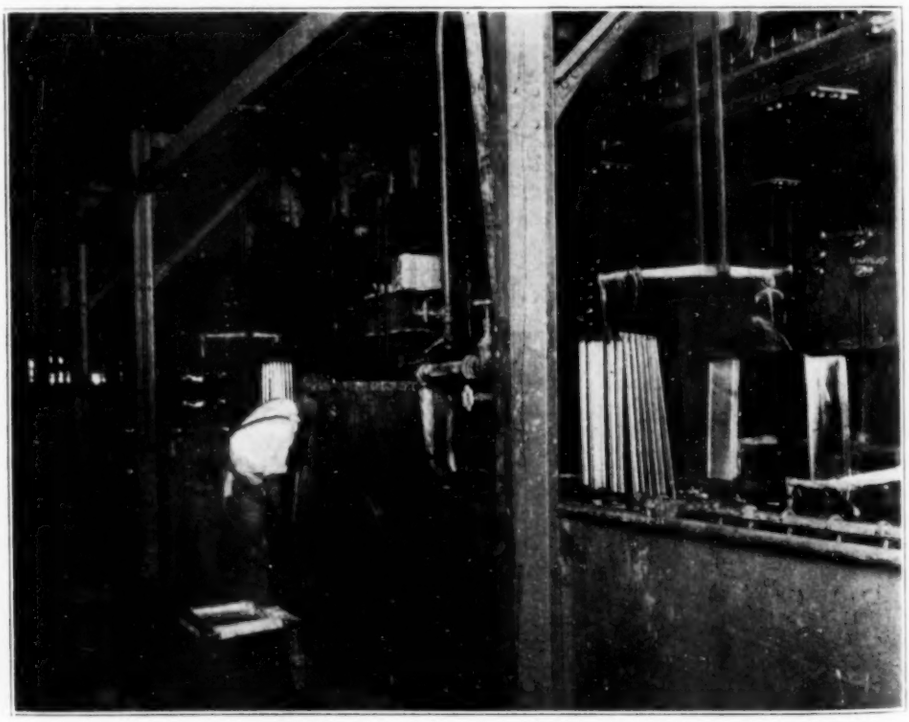
and other parts. Mr. White is a member of Detroit branch and has charge of the polishing, plating, enameling, and sheet metal departments. He is also on the Entertainment Committee for the Convention. The plating is done on full automatic plating machines, one unit for the copper plating and another for the nickel.

Buffing and Polishing Room of the Plating Department. Packard Motor Company

The nickel tank alone is 60 feet long, and it is quite a sight for a plater to see these large automatic machines in operation.

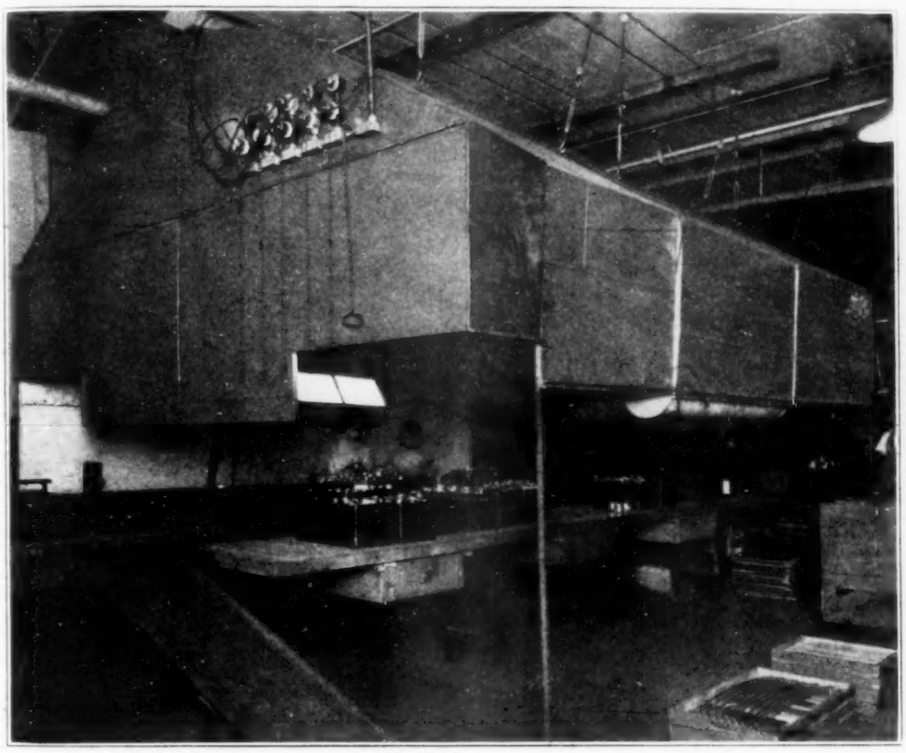
"The Buick Motor Company, with Mr. Ream in charge of the plating, does its chrome plating of shells in an automatic conveyer type of tank which passes three shells at a time through the chrome solution. As the shells reach the lift to hoist them out, the current is automatically cut off and three more shells enter the bath, and the current goes on, as the cycle is three shells every two minutes per unit.

"Now let us look in at the McCord Radiator Company which manufactures the Hupp, Dodge, Studebaker and other complete radiators. The plating department, comes under the personal supervision of W. McCord who is chairman of the convention entertainment committee.



Automatic Plating Tanks, Packard Motor Company

This plant has a capacity for plating 2000 shells per day. You will notice that the shells are copper plated in the acid copper, with mechanical agitation of the up-and-down motion. A heavy deposit of copper is put on, then they are buffed in such a way as to draw the copper over, or as it is termed in the polishing room, cutting out the scratches. They are then nickeled in a hot nickel solution and a heavy coat of nickel is deposited, then nickel buffed and chrome plated.



Chromium Inspection Booth in the Plating Department of the Packard Company

"The chrome tanks are made to hold one shell at a time and a five-minute plate is put on. As they chrome plate 2000 shells per day one can imagine the size of the plating room and the generator capacity required. This will be a very interesting plant to visit during the convention.

"Now let us see what other parts are chrome plated in large production here in Detroit. Let us first take the lamps: head lamps, side lamps, stop light and tail lamps. We will look in on the Hall Lamp Company. Jake Hay is the foreman plater. The lamps are made of brass, but the radiator shell is made of steel and care must be taken to give the brass lamps a heavy non-porous deposit of nickel and buff to a high color before chrome plating. It has been found that brass parts plated with a flash of bright nickel and chrome, do not stand up.

"The Hall Company employs from 200 to 300 polishers and buffers and turn out about 500,000 lamps per month. A chain carrier conveys the lamps from the polishing room to the plating room which passes by the chrome tanks where girls remove them and place them on specially constructed racks suitable to carry the heavy current used in chromé plating. Two lamp shells are placed on a rack. One chrome tank holds three racks. The lamps are plated for three minutes, run through the rinse waters and placed back on the conveyer. This is a continuous process and the production is large.

"Now we must not forget the automobile hardware: door handles, lock frames, cowl mouldings, windshields, and other parts too numerous to mention. At the Ternstedt Manufacturing Company B. Gilchrist, the plating engineer, has the honor of being at the head of one of the largest plating departments in the country. They are plating 20,000 die cast door handles per day, in gold, silver, chrome, nickel and oxidized, on automatic plating equipment of the very latest type. The thousands of other parts that go through this department daily are marvelous, when one realizes that in their generator room they have two motor generator sets 7,500 amperes at 12 volts; one set of 10,000 amperes at six volts; one set 5,000 amperes at 12 volts; three sets, 5,000 amperes at six volts; a total of 45,000 amperes. From this one gets an idea of the magnitude of this one plating department.

"There are many other large plating plants in Detroit; also a number of large job plating establishments. Among them, are the Motor City Plating Company where they are turning out 1,000 radiator shells per day for the Hudson Essex Motor Car Company; the Joseph Robinson Plating Company; the Bromley Plating Company; the Apex Plating Company, and George Rabb, all doing production plating on autos. There is also the Evaco Industries, E. V. Allen, general manager. Mr. Allen, who is president of the Detroit Branch of the American Electroplaters Society won first prize at the Toronto convention last year, and is working hard on another exhibit of plated work for this convention. We feel sure he is going to have a lot of competition, as the platers' exhibit is going to be one of our features this year."

Other Convention Plans

T. C. Eichstaedt, chairman of the Committee on Information, in a conversation with a representative of THE METAL INDUSTRY had the following to say regarding the coming convention:

"Manufacturers throughout this country and Canada who have electroplating departments should be very much interested in having their foremen, electroplaters, chemists, and supervisors attend this convention as there is no other place that we know of, where first hand knowledge of the electroplating industry can be obtained through the

discussion of these papers by the professional and the practical men.

"As the American Electroplaters' Society is a purely educational society and not a Union, as some manufacturers have thought it to be, the convention is first of all an educational institution, and Detroit will make the 1929 convention purely of an educational nature.

"The Entertainment committee has made ample arrangements for entertaining those who attend the convention. There will be a one-half day boat ride down the Detroit river to Bois Blanc Island where there will be a baseball game, other outdoor contests, and dancing, with a real picnic lunch.

"There is also a committee which has arrangements made for entertaining the ladies.

"The registration fee will be nominal, $6.00 for men and $4.00 for women.

"While the Committee on entertainment has not been lavish in expenditures, it does feel that it has a program that will suit the most exacting of those who have attended the conventions of the A. E. S. Everyone who attends will have everything necessary done for his comfort and enjoyment, and especially for his knowledge of that which is new and practical; also that which is still in embryo in the electroplating industry."

C. H. PROCTOR
Founder

Industrial Detroit

Now just a little about Detroit itself. Those who attended the American Electroplaters' national gathering here a number of years ago will be greeted when they come in July with a city that has almost been rebuilt particularly in the downtown section. Old structures have been torn out within the last five or six years and new ones constructed, giving the city an entirely different aspect.

With the changes have been added places of entertainment. New theatres, new parks, new shopping centers, new manufacturing plants with new plating departments and many other new things.

It should be remembered, in spite of all the changes, that the old Detroit river still flows past the foot of Woodward avenue just as serenely and majestically as it ever did. In fact it is about the only old landmark that is left. But it is floating newer and more palatial boats. For a moderate fee as a side line to the convention a plater can visit many interesting places along the Lakes.

Then as to the people. A great many of the older ones are still here, but there also are many new ones who have come from all over the United States and Canada. Many of these newcomers may be kinfolk of some of the platers from distant states. It will be a good time to visit them in July and thus do a double duty—attend the convention and renew old friendships. "But come anyway," is the call from the Detroit branch of the American Platers' Society.

There are many plating installations in Detroit. But many of the larger ones are operated as departments in great manufacturing institutions like the Packard Motor Car Company for instance.

Here are some of the leading independent plants:

A. A. Horsch, 5060 Townsend
Aarol Specialty Company, 5724 Forsyth ave.
Apex Plating Works, 2722 E. Congress
Auto City Plating Co., 6006 Cass
Bromley-Electro Plate Works, 1462 Brush
Buechner Plating Works, 546 West Jefferson
C. F. Plating Company, 226 Mt. Elliott
Echo Plating Works, 1331 W. Warren
Enterprise Electro-Plating & Manufacturing Co., 931 East Fort
Evaco Industries, 1329 E. Vernor
General Chromium Corp., 3220 Bellevue
Grant Silver Plating Co., 409 E. Congress
H. C. S. Plating Co., 1406 Mullett
Hamilton Plating Works, 2136 Putnam
J. C. Robinson, 654 Mt. Elliott
Kuczborski Dominic, 5009 McDougall
Miner Plating & Mfg. Company, 8826 Louis
Motor City Plating Company, 994 Catherine
Oleksik Bros. 5544 McDougall
Parker Rust Proof Company, 2177 E. Milwaukee
Peerless Plating Plant, 522 E. Fort
R. C. Mahoney, 1540 Ann Place
Rex Plating Works, 2554 Grand River
Service Plating Company, 2621 W. Fort
Willis Nickel Plating Company, 625 E. Willis
Wise Chrome Products Company, 2480 Bellevue
Wise Industries, The, 1033 Mt. Elliott
Wolverine Manufacturing Company, 459 Brady

Red Arrow, the Platers' Special Train

A special train for the convention is being arranged for by Horace H. Smith of the Newark Branch. This train, called the "Red Arrow," will arrive at Penn Station in New York on Saturday July 6th at 4:15 P. M. Eastern standard time (5:15 Daylight Saving). All platers leaving from nearby points are urged to get on board as it will be a most enjoyable way of travelling to the convention. For reservations, communicate at once with **Horace H. Smith, 208 North Third St., Newark, N. J.**

The cost of fare and berth to Detroit from large Eastern centers are as follows:

		Lower Berth	Upper Berth
New York to Detroit ...	$24.82	$6.38	$5.16
Newark to Detroit	"	"	"
Philadelphia to Detroit ..	23.23	"	"

Platers leaving from Buffalo can travel by water, leaving Buffalo at 6 P. M. and arriving in Detroit at 9 A. M. Fare is $5.00 one way. Boats leave Cleveland at 11:30 P. M., and arrive at 6:45 A. M. Fare is $3.00 each way; $5.50 round trip; steamers range from $3.50 to $5.00. Meals are served. Special sight-seeing trips can also be arranged for. For full information, communicate with the Detroit and Cleveland Navigation Company, Detroit.

Committee Workers

Detroit Branch has a group of loyal and energetic workers who have labored hard to make this convention the success which it will undoubtedly be. E. V. Allen is president; Charles Mascola, vice president; Charles Phillips, secretary and treasurer; E. G. Lovering, general chairman; T. C. Eichstaedt, chairman of the committee on general information; John Schultz, J. C. Robinson, W. T. Patterson, Art Suttcliff, A. E. Shepard, Al Barrows, R. E. Mitter, H. E. Wagner, chairman of the program committee; H. J. Jameson, chairman of the educational committee; Charles Marker, chairman of the exhibits committee, and William McCord, chairman of the entertainment committee.

Hotel Accommodations

The Statler Hotel, headquarters of the convention, has 1000 rooms, single, $3.00 daily; double, $5.00 daily. All rooms have baths.

The following are other hotels and their rates:

NAME AND ADDRESS	NO. OF ROOMS	SINGLE WITHOUT BATH	SINGLE WITH BATH	DOUBLE WITHOUT BATH	DOUBLE WITH BATH
Addison	400	$1.50	$2.50	$2.50	$4.00
3101 Woodward					
Berkshire	200		1.50		3.50
80 Winder Street					
Book-Cadillac	1200		3.00		5.00
Wash Blvd. and Mich.					
Brunswick	100	1.50	3.00	3.00	5.00
542 West Grand River Avenue					
Barlum	810		2.50		4.00
Cadillac Sq. at Bates			up		up
Detroit-Leland	700		3.00		5.00
Cass at Bagley			up		up
Fairbairn	450	1.50	2.50	2.50	3.50
Columbia St. at John R.					
Fort Shelby	900	2.50	3.00	3.50	4.50
Lafayette and First					
Fort Wayne	293		2.50		3.50
Cass and Temple			up		up
Franklin	80	1.50		2.50	
Bates and Larned Streets					
The Grant, 2931 John R.	200		2.00		4.00
Imperial	200		2.50		4.00
26 Peterboro		per week	16.50	per week	19.00
Lincoln	125	1.50		2.50	
1505 Center St.					
Madison-Lenox	300	2.00	2.50	3.00	3.50
Madison Ave.					
Norton	250	2.00	2.50	3.50	4.50
Jefferson and Griswold					
Norton Palmer	200	2.00	2.75	3.50	5.00
Windsor					
Palmetto	324		3.00		4.00
John R. and Hancock			up		up
Prince Edward	250		3.00		5.00
Windsor, Ontario					
Royal Palm	180		3.00		4.50
2305 Park Ave.					
Savoy	750		2.50		4.00
Adelaide and Woodward					
Seward Apartments	600		3.00		4.50
59 Seward					
Stevenson, 46 Davenport	207		2.50		4.00
Tuller	800		2.50		5.00
Grand Circus Park					
Webster Hall	766	2.00	2.50	4.00	
111 Putnam Ave.			3.00		
Wolverine	500		2.50		4.50
Witherell and Elizabeth					

Tentative Program

Monday, July 8. Morning. Registration and Get Acquainted Period.

Afternoon. Opening Program. Welcome speech on behalf of Detroit.

Evening. Educational Session.

(1) "Scientific Plating Control"—Prof. L. C. Turnock, Turnock Engineering Company, Cleveland, Ohio.

(2) "Wage Incentives"—A. L. Matthes, Westinghouse Electric & Manufacturing Company.

(3) "Industrial Cleaning of Metals—Dr. A. K. Graham, University of Pennsylvania.

(4) "Executive Foremanship"—J. M. Carmody, Factory and Industrial Management.

(5) Question Box Period.

Tuesday, July 9. Morning. Educational Session.

(1) "Brass Plating"—George B. Hogaboom, Hanson, VanWinkle, Munning Company.

(2) "The Electrodeposition of Iron"—T. P. Thomas, Pittsburgh Branch, A. E. S.

(3) "Electroplating of Cadmium from Cyanide Baths"—Clayton M. Hoff. Grasselli Chemical Company.

(4) "Cadmium Plating"—H. C. Pierce, Udylite Process Company.

(5) "A Report on the Possibilities of Poisoning from Cadmium Plate"—George Dubpernell, Udylite Process Company.

(6) Question Box Period.

Afternoon. Educational Session. Chromium Symposium.

(1) "Chromium Plating Factors"—Oliver Sizelove, Associate Editor, THE METAL INDUSTRY.

(2) "Some Causes of Resistance in Chromium Plating Solutions"—Prof. D. T. Ewing. Michigan State College.

(3) "Some Observations on the Corrosion of Chromium Deposits"—Cleveland Nixon, Chicago Branch, A. E. S.

(4) "The Bent Cathode Test for Chromium Plating and Some Observations on Chromium Plating." —Prof. E. M. Baker, Consulting Chemical Engineer, and W. L. Pinner, Chemical Engineer, General Spring Bumper Company.

(5) "Conditions that Cause Changes in the Composition of Plating Baths and Possible Remedies"—Prof. F. C. Mathers, University of Indiana.

(6) Question Box Period.

Evening. Research Session.

(1) "Summary of Researches on Electroplating"—Dr. W. Blum.

(2) "Final Report Spotting Out of Plated Metals" —W. P. Barrows.

(3) "Throwing Power in Chromium Plating"—H. L. Farber.

(4) "Report of Joint Investigation. Measurement of pH in Nickel Plating Solutions"—Dr. W. Blum.

(5) "Reports from the Research Committee"—R. J. O'Connor, and P. Sievering.

(6) "Plans for Future Researches."

Wednesday, July 10. Morning. Educational Session.

(1) "Material Costs of Various Finishes"—C. Van Derau, Westinghouse Electric & Mfg. Company.

(2) "The Determination of Boric Acid in Nickel Solutions"—Dr. H. H. Willard, and G. W. Ashworth.

(3) "Electrodeposition of Non-Metallic Materials" —Milford H. Corbin, Chemical Engineer, Roxalin Flexible Lacquer Company.

(4) "The Measurement of Chlorides in Nickel Plating Solutions"—Donald Wood, Walter S. Wood Company.

(5) "A Warning"—W. M. Phillips, General Motors Corporation.

(6) Question Box Period.

Afternoon and Evening. Trip to Bob-lo.

Thursday, July 11. Morning. Business Meeting. Afternoon. Plant visitation. Evening. Banquet.

Each paper will be allowed a maximum of 35 minutes for reading and discussion. Additional discussion, if any, will be possible during the "Question Box" period at the end of each session.

"Question Box" periods, at the end of each session, will be in charge of George B. Hogaboom.

International Fellowship Club Meeting

A luncheon meeting will be held by the International Fellowship Club on July 9th at the Hotel Statler. The speakers at this luncheon will be Dr. Blum, chief of the Division of Electrochemistry of the Bureau of Standards, who will talk on Research on Electroplating Processes, and A. P. Munning, chairman of the board of the Hanson-Van Winkle-Munning Company who will speak on the Application of Research Results as Applied to Commercial Practice.

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Hanson-Van Winkle Munning Co.
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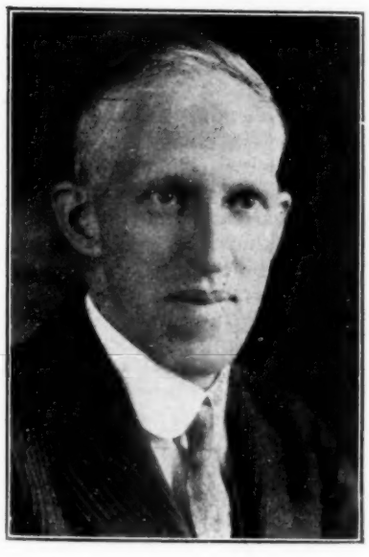


Dr. WILLIAM BLUM
Chief of the Division of Electrochemistry, Bureau of Standards,
Washington, D. C.

These two men are probably the foremost in the United States in their respective fields.

It is expected that the meeting will be largely attended, as the Fellowship Club intends to hold a lively and worthwhile meeting in addition to the part devoted to these unusually strong speakers.

Supply Man Will Fly to the Convention

It is the purpose of Wilfred S. McKeon, president of the Sulphur Products Corporation, Greensburg, Pa., to fly from his town to Detroit, to attend the convention of the American Electroplaters' Society. Mr. McKeon will have the honor of being the first person to fly to one of these conventions.

Wilfred S. McKeon

Return Certificates

All who attend should be sure to get return certificates when buying tickets for Detroit. The number of certificates required has been reduced from 250 to 150. By getting a return certificate visitors will save one-half of the return railroad fare, if 150 return certificates are turned in.

Thanks to Electroplating Instructor

The Electroplating Class in the College of the City of New York, which Dr. L. C. Pan has so successfully guided through the spring course of 1929 wishes, publicly, in THE METAL INDUSTRY, to express its deepest admiration and its sincerest thanks for the kindly, generous and intelligent instruction which has always been forthcoming from him.

East Is West in Electroplating

How Japan Has Adopted American Production Methods

By A. P. MUNNING 2nd

Kabushiki Kaisha A. P. Munning & Company, Kobe, Japan
Division of Hanson-Van Winkle Munning Company

WRITTEN ESPECIALLY FOR THE METAL INDUSTRY

DESPITE the many international events and scientific agencies which have tended to make us world minded since the Great War, it is astonishing how few Occidental peoples engaged in their own industrial pursuits have ever given thought to the remarkable advances continuously being made by their fellow-men in the far corners of the globe.

Masters of industry who depend on expanding markets for the sale of their products and for sources of new materials have not overlooked the prospects of serving and being served by peoples who are gradually adopting the way of the West, but the layman is even now inclined to regard Japan, Korea, China, India and the other Asiatic nations as vast romantic stretches as primitive and legendary as they were a millennium ago.

It is true that many of the methods and customs of the Orient are still crude but here and there scattered throughout the various provinces are plants as modern as can be found anywhere and in many respects in degree of development they excel many on the Western Continent.

As an instance of this industrial expansion, we may point to the newly constructed plant of the Columbia Graphophone Company in Kunesaki, Kawasaki, Kanagawa-Ken, Japan, midway between the cities of Tokyo and Yokohama.

The Columbia Graphophone Company of London acquired this plant from the Nipponophone Company, Limited, in October, 1927, and immediately undertook a program of increased and improved production with the result that on December 19, 1928, when the new works were formally opened, Japan possessed as efficient a phonograph factory as any in the world.

Only the very latest mechanical ideas and most up-to-date processes of record manufacture were installed and these changes were accomplished without interfering with regular production. The capacity of the old Nipponophone plant was augmented to four times its former production, or to more than one million phonograph records per month. On the completion of even later extensions, which are now under way, the plant will have a potential monthly capacity of over two million records.

All of the layouts and installations of these factories were designed and carried out by C. H. Claydon, Industrial Engineer of the Columbia Graphophone Company, London, while the operations have been supervised by L. E. Gillingham who for many years prior to his work in Japan, was a factor in the phonograph industry in the United States.

Experienced foreign foremen were engaged to train the Japanese workmen in putting the new processes into operation, and it was found, after a short time, that in many respects the output per day per Japanese was equal to that produced per person in American and English concerns.

The plant above described is completely constructed of Truscon standard steel buildings having a floor area at present of over 2,200 tsubo or the approximate equivalent of 80,000 sq. ft., in addition to a new two-story stone administration building.

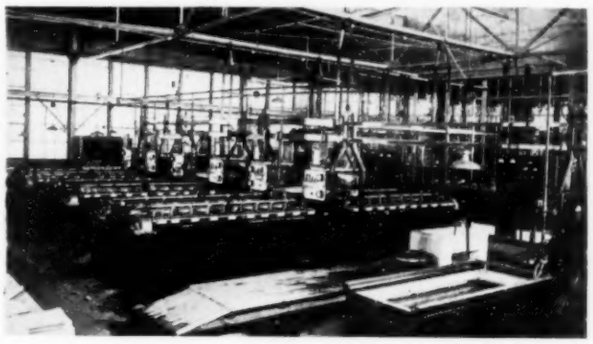
The manufacture of phonograph records involves many different processes, beginning with the preparation of the wax disc for rendition to the blanking out of the final black composition discs which are called records.

Readers of THE METAL INDUSTRY will, however, be interested principally in the electroplating plant and we shall, therefore, describe in brief the plating department which is here illustrated.

Since the picture above was taken, it was found, as mentioned before, that facilities for an increased volume of business were contemplated, so for this reason, an extension to the plating room is to be cut in the far end of the building for the installation of eight (8) additional tanks.

The present plating room was planned according to the most improved standards; energy is being supplied to the acid copper and the nickel baths by two 3,000 ampere and three 1,500 ampere, 6 volt Hanson-Van Winkle-Munning Company's Interpole Generators mounted in a row along the east wall of the department. One of these can be clearly seen in the photograph. Voltage regulation is effected in the tanks with the use of Hanson-Munning Tank Rheostats which are also shown in the picture.

The bus bar systems are of laminated flat rolled copper stock neatly supported on angle iron frames. Double



Plating Plant of the Columbia Graphophone Company, near Tokio, Japan.

compartment plating tanks are used throughout and the solutions are gently agitated by work holders having an oscillating motion. A novel and effective system of continuous filters of extremely simple construction is used for each of the solutions.

The filters are made as follows: water tight boxes, having an inlet in the bottom, so that the solution level of the tanks is constantly maintained in the boxes, are attached to the ends of the tanks.

Across the top of each box, mounted on bearings, is a vertical impeller with four involute blades which pick up the solution as the wheel rotates and causes it to discharge into the tank through a hollow radial hub. Suspended below the outlets, which are raised slightly above the solution are felt filters which trap the sediment and allow the clear solution to return to the baths. Small pulleys on the impeller shafts are belted to line shafts driven by small motors on the opposite end of the tanks.

The sinks in the plating room are made of acid resisting tile and the floor is of composition material instead of concrete, thereby preventing the raising of dust which ultimately finds its way into the tanks.

Copper and nickel deposits on matrices are being produced in various ways by different record manufacturers. The installation here pictured is operating highly satisfactorily and efficiently and is one of the finest processes of its kind.

American platers and engineers who believe that modern appliances have not as yet been introduced into the Oriental countries will be surprised to know that there are a number of other concerns in the Far East who likewise do electroplating on a comparatively large scale.

The art of electroplating is no longer confined alone to our own and to the mother countries of Europe. Its practice has become universal and we may now also look to other parts of the world for contributions to its further development and utilization.

Fine Metal Work in Medals

In our January issue, in a report of the activities of the American Electrochemical Society, we described in detail the establishment of the Acheson Fund by that Society, to be used in promoting electrochemistry. The award consists of a gold metal and a cash prize of $1,000,

Acheson Medal—Both Sides

to be given every two years for the most distinguished contribution to the advancement of electrochemistry.

The medal to be given will be made of gold, designed by Georg Lober, sculptor, 6 E. 15th Street, New York, and reproduced by the Medallic Art Company of New York. Mr. Lober is a sculptor of reputation with wide experience in this field. The Medallic Art Company has been reproducing medals successfully since 1900, having made, it is stated, fully nine-tenths of the medals designed by American sculptors. They are also the only firm in the United States commissioned to make dies for the United States Mint for use on American coinage.

The methods of reproducing medals from sculptors' models are unusually interesting. All modern medals are made from steel dies. First a design is created by the sculptor who models it in clay many times larger than the size to be produced. In this way he can give full value to detail. The sculptor's model is then cast either in plaster or in bronze in the negative. From this a positive casting is obtained. From this positive casting a final steel hub of any size desired can be made by means of die cutting machines based on the pantagraph principle.

The steel reduction is exact reproduction of the sculptor's original model. This is sunk in an opposing block of steel forming a reverse die from which models are struck in bronze, silver or gold in large presses, under a pressure of 125 tons per square inch. The illustrations show both sides of the Acheson medal, an excellent example of the modern development of an art which dates back as far as 700 B.C.

Below is shown the medallion, designed by Franklin Booth, and adopted as the official insignia for Light's Golden Jubilee to commemorate the 50th anniversary of the perfection of the incandescent lamp by Thomas A.

Insignia of Light's Golden Jubilee

Edison. One side of the medallion shows the head of Edison, to whom a fitting tribute is to be paid by a series of celebrations, culminating on October 21, 1929, in a great festival of light, and bears the words, "Light's Golden Jubilee, Thomas A. Edison." The other side of the medallion shows the progress to the electric lamp from its inception.

MEASUREMENTS OF HYDROGEN ION CONCENTRATION IN PLATING BATHS*

By R. E. Brewer and G. H. Montillon.

The hydrogen ion concentration, pH, of representative acid plating baths has been measured successfully by the electrometric method, using different kinds of indicator electrodes. The theory of the electrodes used—hydrogen, oxygen, quinhydrone, antimony, and lead dioxide—is discussed. The calibration of the oxygen and antimony electrodes, together with the equations for their calibration curves against the normal calomel electrode, are given. Conditions for the best experimental procedure have been established, as well as limitations of various electrodes, in typical nickel, cobalt, iron, zinc and chromium baths.

A comparative study of the results of electrometric and colorimetric methods of measuring hydrogen ion concentration has been made. Titration curves have been constructed from data obtained by adding known volumes of standard acid or alkali solution to a measured volume of the bath, observing by electrometric and colorimetric methods the resulting pH after each addition, and plotting the results. Comparisons of the curves are given.

Measurements of hydrogen ion concentration have been made by a simple buffer comparison method. Comparison of these results with measurements made on the same baths, employing the colorimetric "drop-ratio" and the usual electrometric methods using different kinds of electrodes, show the reliability and utility of this procedure. The method provides for rapid cross-checking of all measurements.

*Abstract of a paper read at the Spring meeting of the American Electrochemical Society in Toronto, Can., May 27-30, 1929.

The Electro Deposition of Tin

Recent Improvements in Sodium Stannate Solutions

By CHARLES H. PROCTOR

FROM THE MONTHLY REVIEW OF THE AMERICAN ELECTROPLATERS' SOCIETY, APRIL, 1929.

It is not the intention of the author again to go into the history of electro tin plating or its deposition by simple immersion or by the contact method. These data were published in detail by the author in a paper read at the Newark, N. J., meeting of the American Electroplaters' Society in June, 1926, and will also be found in THE METAL INDUSTRY, December, 1926, pages 502-503. Another very excellent paper covering the same subject was also printed in the November, 1926, issue of THE METAL INDUSTRY, page 463, entitled "Electro Deposition of Tin" (Practical methods of tin plating), by Walter Fraine. These two papers cover in detail the sodium stannate tin solution first introduced to the metal fabricating industry by the author.

In the past few years the electro deposition of tin in the metal fabricating industries has grown to be of great importance primarily because tin is nature's best gift to mankind to coat steel with for protection and conservation of his food products, almost indefinitely, as pure as when they came from nature's gardens.

The saving in cost to the consumer in food products so conserved runs into hundreds of millions of dollars per year.

Electro tin deposits, however, are not as yet applied to the thin sheets of steel which eventually become the "tin plate of commerce." All tin plate is produced by the application of molten tin to the sheet steel by immersing the cleansed and previously fluxed sheet steel in the molten tin bath with subsequent quenching in the proper cooling medium which results in the bright tin plate of commerce. Hundreds of thousands of tons of such product is produced in America today.

In the non-ferrous metal industry, however, the electro deposition of tin, especially in the production of tinned sheet copper and brass, has not assumed great tonnage production. The hot tin application is still used extensively for the purpose, for the coating of sheet copper with tin for heavy coatings especially adapted for the fabrication of copper steam kettles used in the dairy, vegetable and fruit preserving and candy making industries, electro deposited tin upon copper, and finally rolled under the usual metal rolling process to produce hardness and render the crystalline structure of the deposited tin, less crystalline and more compact due to a slight elongation of both the tin and copper resulting from the metal rolling process is constantly on the increase.

One of the largest copper and sheet brass and incidental products industry in America, if not in the world, is using the electro tin plated process for sheet copper as outlined.

The value of tin as we all know from the hundred of millions of tin cans used in the cooking and preservation of all kinds of food products is because tin is not acted upon by latic acid or any of the fruit and vegetable acids that nature has placed in our food products for the good of humanity.

In the electric refrigeration industry electro tin plated deposits upon copper refrigerating coils, etc., is being used very extensively. One of the largest of such firms in the middle west operates a complete tin plating unit for this purpose. It is completely automatic in every detail from the cleansing of the copper coils, etc.; the coppering over of the soldered joints, etc., by copper plating, the several water washings, the final tin plating, washing and drying of the product, so that it eventually is placed by mechanical conveyors in front of the inspector to be finally passed along for assembly and finished product.

The tin plating bath alone has a volume capacity of 20,000 gallons. In addition many mechanical plating barrels are operated in the same plant for tin plating small metal parts used in the construction of the refrigerating units.

In your great and wonderful magic city of Chicago electro tin plating has been done for more than fifteen years. Quite recently a very progressive firm of mechanical platers for the jobbing trade installed electro tin plating baths from data submitted to them by the author, and their business is constantly growing for electro tin plated products.

In the telephone industry, electro tin plating will no doubt be used extensively for the protection of brass and copper fabricated parts from atmospheric oxidation. One of the largest of such firms has adopted the method after extensive research by their engineering department.

In the manufacture of all types of meters, whether electrical, gas or water, electro tin deposits have been found to be the best protecting factor against oxidation for all the small gear parts, pinions, etc., used in the construction of such meters. Especially so is this true for meters used in tropical countries where high humidity atmospheric conditions exist.

Cadmium deposits were first tried out but due to galvanic action between the brass metal and the cadmium deposit, the cadmium disintegrated and returned to a semi-oxide condition and became entirely non-adhesive, so its value for protecting brass from atmospheric oxidation is practically valueless.

It is possible to continue the elaboration of the value of electro tin deposits further, but it is not necessary for the purpose the author has in mind, that of giving data covering the improvements in the present tin electrolytes. There is, however, one important factor that I should mention to you considering the tremendous increase in cost of cadmium metal during the latter months of 1928 which will eventually destroy all interest in the metal from its economic value as a maximum factor in the protection of ferrous metals, iron and steel, from atmospheric corrosion and eventual destruction and be replaced with deposits of zinc from improved methods of deposition and the introduction of the rustproof black finishes.

The metal fabricating industry has appreciated the protective value of cadmium for their steel, malleable iron and cast iron products subject to the danger of atmospheric corrosion, but the increasing cost of cadmium due to the natural law of supply and demand is compelling them to revert to other methods that will make for the economies sought in great mass production.

The electro deposition of cadmium can be replaced as a protecting anti-corrosion factor by deposits of zinc at one-twentieth the cost of cadmium, when the cost of the metal at one dollar and twenty cents per pound is used as

a basis as against ten cents per pound for electrolytic zinc. Furthermore, we must also consider that the density of cadmium is 75 per cent greater than zinc, when we reduce density to cost figures, then we find a cubic square inch of cadmium will weigh 75 per cent more than an equal cubic square inch of zinc. You can see then that if you deposit one ten-thousandth of an inch in thickness of either cadmium or zinc upon a basic metal surface the cadmium will be 75 per cent heavier than the zinc in weight. Therefore, in figuring costs of cadmium plating as compared with zinc upon its true basis you will arrive at a cost of twenty to one as compared with the same thickness of zinc deposit at a cost of ten to fourteen cents for zinc anodes.

It is always well to remember that you cannot deposit any metal at a lower cost than that of the price of the anode irrespective of any contention or controversy to the contrary.

When you have decided to replace cadmium with zinc then install an improved electro tin plating solution, if you decide that you want a finish equal in whiteness to that of cadmium. Only a very minute deposit of electro tin will be necessary upon the basic deposit of zinc then you will have produced a duo deposit of zinc and tin that may give you even a greater protective value than it is possible to obtain from either zinc or cadmium alone, at one-tenth the cost of cadmium. The tin will prevent the zinc from atmospheric oxidation, therefore, a more perfect protection against atmospheric corrosion should result.

In the R. & H. Chemical Company's research division at Perth Amboy, N. J., we are making comparative tests as to the economic and protecting value of the duo deposits of zinc and tin as against zinc or cadmium as separate protecting factors. Metallic tin costs only one-half the price of cadmium.

I have elaborated in detail because I desired to bring the true story of electro deposits of tin to you. In my December, 1926, paper covering the "Electro Deposition of Tin" the following formula was given:

Water	1 gallon
Sodium stannate (Na_2SnO_3)	28 ounces
Hydrated tin oxide	2 ounces
Powdered white starch	⅛ ounce

The latter material as the brightening agent for the tin deposit.

Potassium resinate was also given as a colloidal factor for the production of whiter and brighter deposits of tin. The temperature of the bath 160 to 180 degrees Fahr. Voltage, 4 to 6. Anodes, pure Straits of Malacca tin in connection with anodes of sheet steel—70 per cent of the anode surface to be of tin and 30 per cent sheet steel. Stannous chloride ($SnCl_2H_2O$) was also mentioned as an excellent reducing agent.

Mr. Walter Fraine in his excellent paper presented at the convention of the American Electroplaters' Society, June-July, 1926, gives almost identical data for electro tin plating with a sodium stannate solution.

Later some modifications in the original solutions as introduced by the author were made. Lower density solutions gave just as good results, hyrdated tin oxide additions were eliminated, also the starch as a brightening agent. Stannous chloride and the potassium resinate were still found to be satisfactory as addition agents.

IMPROVED TIN PLATING SOLUTION

Water	1 gallon
Sodium stannate	12 ounces
Sodium acetate	2 ounces
Sodium hydroxide	1 ounce
Sodium perborate	⅛ to ¼ ounce

Temperature, 160-175 degrees Fahr. E. M. F., 4 to 6 volts. Cathode current density, 20 to 60 amperes. Anodes, pure Straits tin. Ratio, 3 to 1 anode cathode.

Preparation of Solution

Dissolve the sodium stannate in about 50 per cent of the total amount of water at 150 degrees Fahr., then add the caustic soda, sodium acetate and finally sodium perborate. Steel tanks are advisable for electro tin plating solution, heated with iron steam coils.

The solution is quite easy to control but whenever possible chemical analysis is preferable. This is true for all plating solutions. Know the composition of your solutions then make additions accordingly. Only upon such a basis can you develop "Standard Solutions" and their control on an economic basis.

Maintain the density of the tin solution as an approximation at 10 degrees Baume. The addition of sodium stannate to maintain this density will depend upon actual amount of metal products produced from the tanks, and the loss in drag out. It may require a minimum of one ounce per gallon of solution or several times the amount.

When the caustic content of the solution is correct the tin anodes cover over with a very thin yellowish green film during electrolysis. Absence of this film and very white anodes denotes an excess of caustic soda. The excess can be reduced by the addition of glacial acetic acid in small quantities until the anode coating is normal. The addition of acetic acid and its neutralizing action upon the caustic soda forms sodium acetate which is an essential factor of the solution. If, at any time, the caustic soda content becomes too low for successful anode corrosion and throwing power then additions of ⅛ to ¼ ounce per gallon of solution should be made but should not be exceeded until the results have been determined by trial tests.

The addition of sodium perborate should be made when the tin deposit no longer shows the semi-luster white color. One-fifteenth ounce or less will be ample per gallon of solution. The sodium perborate is apparently more active when first dissolved in warm water, then very slightly acidulated with acetic acid, so that a very light pink tone is discernible when a blue litmus paper test is made.

In mechanical barrel plating the density of the solution may be increased up to the following proportions:

Water	1 gallon
Sodium stannate	16 ounces
Sodium hydroxide	4 ounces
Sodium acetate	4 ounces
Sodium perborate	¼ ounce

Anode to cathode ration, 1 to 1 to 2 to 1. Amperage, 10 to 15 per square foot of surface area. Electro motive force, 6 to 8 volts. Temperature, 140 to 160 degrees Fahr. Speed of rotation of barrel, 10 per minute, plus or minus. The control of the barrel or mechanical solutions is identical with still plating solutions.

It has been found that the still solution formula gives excellent results also in a barrel, so it can be left to the plater or chemist to decide just what proportions for solution is best adapted for his purpose, from the minimum to maximum formula outlined.

All commercial metals and alloys may be plated with electro deposits of tin from these solutions. Cast iron, steel, copper, bronze, brass, zinc, lead, zinc die castings and cadmium. The necessary cleansing must be carried out under commercial conditions best adapted for the respective metals to be tin plated. As all platers as a rule thoroughly understand the preparation of the basic metal surfaces and their chemical cleansing it is not necessary to go into the matter in detail at this time.

Electroplating Helps the Talkies Talk

The Electrodeposition of Metals in Manufacture of Records Puts the Electroplater in a Prominent Position in One of America's Great New Industries

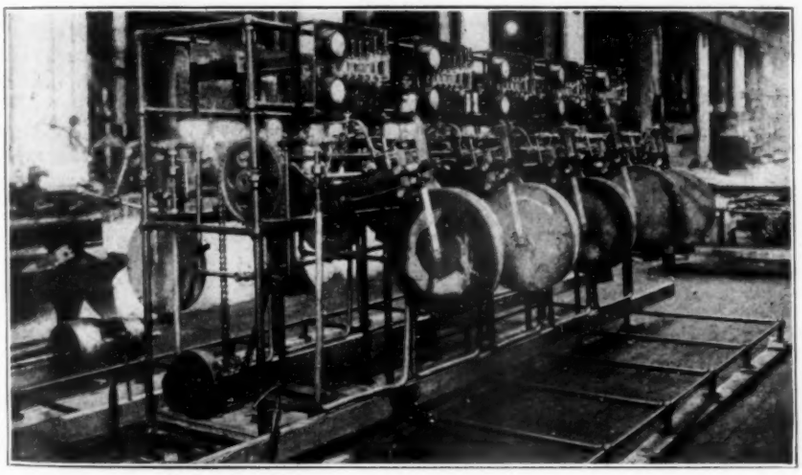
THE term "electroplating" as a general rule conjures up for the average layman who is well acquainted with this tremendously important art such well known images as silverware, automobile parts, nickel or gold plated watches, and other commonplace objects. Those who are engaged in this field, or who have some definite connection with it, or who have had reason to investigate it from a less superficial viewpoint, however, realize that electroplating does not merely concern itself with the decoration of common articles in general use but that it is employed in many branches of art and industry which, when exposed to the layman are, to say the least, very startling. Thus, it is quite wonderful to our friend the layman to discover that without the plates produced by electrodeposition he would not have as much or as fine or as cheap printed matter; or that his babies' first pair of shoes can be covered with gold by electroplating; or that his glassware can be adorned with gold or silver by electroplating. But, as previously remarked, the electroplating industry knows of most of these uses of the art. It is quite general knowledge in the electroplating field that phonograph records are produced by stamping out discs of specially prepared wax with a matrix or "mother" record that is made of metal. And, also, it is quite well known that the matrix is produced by electrodeposition of a special kind. This method of reproducing records was introduced many years ago and has been found the most reliable and economical means of doing the work.

The ordinary phonograph record, ten or twelve inches in diameter and about an eighth of an inch thick, was produced in approximately the following manner:

A wax disc about the same diameter as the record—say twelve inches—and about one and one-quarter inches thick, with one side flawlessly smooth, was placed on the recording machine. The machine in the old days resembled an old style phonograph, having a horn into which the music or voice was directed. The modern method has done away with the horn; a microphone is now used, the recording method being a complex electrical one which produces similar records but of much finer reproducing qualities. There is no needle in the machine, the grooves being cut by a special stylus. The stylus vibrates according to the sounds transmitted through the microphone into the recording apparatus, while the wax disc revolves on a flat metal disc similar to that with which the ordinary phonograph is equipped. The process of recording is timed accurately and the music or whatever is being recorded is arranged in such a manner as to fill the record.

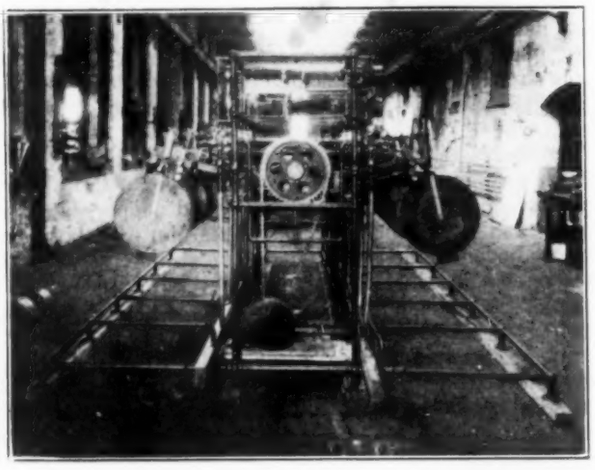
The early method of using this wax record was to coat it with graphite, place it in an acid copper bath and give it a very heavy coat of electrodeposited copper, the plate usually being .060 inches thick. This film of deposit was then removed. Its reverse side, of course, showed the lines on the original record, but in relief rather than in intaglio, as seen on a regular record. The film was brushed up very slightly, with great care not to injure the minute ridges on the reverse side, and then placed back in the solution and plated in the same manner as previously outlined. A slight change in the procedure was to place it first in a silver dip and then in a tincture of iodine stripping solution and then in the acid copper solution. A .060 in. deposit was plated on and then the plate was removed and separated from the "relief" record. This, obviously, produced a metal record with obverse lines. This was cleaned and put through the plating process again and when a second plate was produced with the lines in relief, it was polished, backed up with metal and what was known as the "stamper" was obtained. The metal record from which the stamper is produced is called the "matrix" and this is kept to produce stampers. It is not, as often erroneously stated, used for stamping out records, as its vibration lines are just like those of a regular wax record, in intaglio.

In the old days a stamper was good for about a dozen records. It was then discarded and another stamper was used for pressing out the wax discs. In order to make the stamper more resistant to the wear of the pressing operation, a deposit of nickel was tried on its surface and it was found that a one-hour nickel deposit made the stamper sufficiently tough to press out from 250 to 300 records.



Plating Machine Used in Making the Nickel Matrices and Stampers for Producing Records Used in the Talking Motion Pictures. The Discs Seen Are the Plates Which Lie Between Two Records that Are Plated at One Time. The Frames of Pipe on the Floor Hold the Tanks of Solution, Which Are Not Shown in This Photograph. In Plating, the Discs Revolve and Also Move Up and Down. As Shown, Electrical Control Apparatus Is Attached to Each Pair of Revolving Discs.

Today, the whole electroplating procedure has been revised. From the first wax disc a copper stamper is taken. This is nickel plated instead of copper plated, the nickel deposit applied being .005 or .006 in. thick. This film of nickel is then backed up with copper to a thickness of .060 in. The back is kept smooth in order to make it readily adaptable to the press. It has been found that the nickel face remains clean and untarnished. The first matrix and stamper are kept as permanent records and others are made for actual stamping work. It has been found that the nickel stampers can produce 15,000 to 20,000 records each.



End View of Machine Shown on Page 269

The plating process by means of which the matrices and stampers are being produced today in most of the great plants where records are made was devised in the laboratories of the Hanson and Van Winkle Company, then of Newark, N. J., and now a part of the Hanson-Van Winkle-Munning Company, Matawan, N. J. Most of the development work was done by Willis R. King, who is still engaged in research and development work for the company. The plating work today is done on the machine shown in the illustration, which automatically plates the wax discs and the matrices. And now this machine has been adapted to the production of records for use with talking motion pictures, variously known as the "talkies," "speakies," and otherwise.

The apparatus was designed with certain definite principles in view. It was determined that a machine which would revolve the circular discs would make for more uniform deposition than one in which the solution was merely agitated with a back and forth motion. The apparatus designed provides for a revolving motion and also an up-and-down stroke, with the record moving on its center at 10 to 15 r.p.m. By means of this motion during the plating operation a higher current density is made possible and great smoothness of deposit is effected.

The machines are built in units of ten tanks each, with two groups of five tanks on each side. Ammeter and voltmeter control is provided for each pair of records in solution, and the solutions are heated by steam and cooled by cold water. Perfect control of the process has been thoroughly developed; the time-lengths of operation are definite and are not changed. During the years it has been in use—since 1912, that is—a number of changes and improvements have been made. Oilless bearings of oil-impregnated hardwood or bakelite have been devised in order to prevent pollution of the baths. Metal bearings were found to be unsuited.

The latest application of this machine gives the electroplating industry a definite part in one of the most interesting and ingenious developments of the century, the talking motion picture.

Metals in Modern Design

Modern design and new uses of familiar and unfamiliar metals by American artists were demonstrated recently in an exhibit of Modern American Design at the Newark Museum, Newark, N. J. Chrome-nickel, Monel, chromium, aluminum, iron, silver, gold and viscoloid bakelite, vitrolite and formica are some of the materials used by the modern designers. The objects displayed are for the most part house furnishings.

Courtesy, Newark Museum

Entrance to the Exhibit

Many novelties in the use of metal were shown. Lee Simonson's grand piano with intricate metal supports replacing wooden piano legs was one of the most conspicuous innovations. Several lamps by Egmont Arens showed an inspiration from machine design in name and structure. "Pipe Organ," "Pleating Roller," and "Cogwheels," three of them were named. "Cogwheels" had a base of black viscoloid, and was decorated with a pattern plainly derived from the mechanical device it is named after. A pair of boudoir lamps by Arens were made of aluminum jelly-moulds and funnels.

More than a hundred objects by about thirty artists were displayed. Metal chairs and tables, screens, mirrors, wall-brackets, gates, door, hat racks and chandeliers are some of the larger works of art and industry placed on view by the Museum. Tableware in silver and silver plate and Monel metal were on view. A faucet drain-pull in satin finish chromium plate was one of the objects shown. It was designed by one of the well-known "masters" of modern American design.

Room Decorated with Metals

At right is a picture of an open air loggia for an apartment house design by Raymond M. Hood. This is supposed to open off an apartment living room. Its cast concrete walls are solid and substantial, and chromium plate has been used for the ceiling and the overmantel of the fire-place. The furniture is all aluminum covered with fabrikoid. This type of decoration was one of a number shown in the unique exposition of American Industrial Art at the Metropolitan Museum of Art in New York. The furniture and room decorations are modernistic in style.

Chromium Experiments

A Series of Tests on the Various Factors Affecting the Operation of Chromium Solutions

By OLIVER J. SIZELOVE

FROM THE MONTHLY REVIEW OF THE AMERICAN ELECTROPLATERS' SOCIETY, APRIL, 1929.

CHROMIUM was suggested as a study by members of the Newark Branch in the class that was taught last winter at the Vocational School at Newark. The solution or formula taken was the Bureau of Standards' formula that was used in all our experiments and it was simply a repetition of the work that has been done by the Bureau of Standards by the plater or common plater, I will say, of today. Those experiments were practically duplicated, showing you that it doesn't require a man with a great knowledge of chemistry to produce those same results.

The students, foremen electroplaters, of the Electroplating class at Sussex Avenue Vocational School, Newark, New Jersey, requested that a study be made of chromium plating solutions. The class was divided into two small groups, each group under the leadership of a plater, who possessed a fair knowledge of the chemical control of plating solutions in general. The whole class was under the direction of the instructor.

The plan of study included the making of a chromium solution according to a workable published formula, and the effect of different variables on the operation of the solution and the character of the work produced. The Haring formula, as published in the U. S. Bureau of Standards Technologic paper No. 346, was used. The variables included temperature, area of anode and cathode surface and their relation to each other, metal for anodes, metal for cathodes, current density, concentration of chromic acid and of sulphuric acid and cathode efficiency. The "tanks" used were made of steel and had a capacity of two gallons. With a few exceptions made for experimental data, the cathodes were rolled brass which had been colored buffed. Anodes of steel, of stainless steel, and of lead, were used. In all runs the area of the anode was one-half of that of the cathode, except in one run where the effect of the area of the electrodes was studied. Two anodes and one cathode were used. Th cathode area was sixteen sq. in., 1/9 sq. ft. or 1 dm.^{2}, the distance between electrodes four inches.

Effect of Temperature

Having an anode area of one-half the cathode area and keeping a constant current density, 1.25 amperes per sq. inch, the effect of varying temperatures is quite noticeable. At 90° F. the polished brass cathode assumes a dull milky color with cloudy edges. At 113° F. the center of the cathode is clear and bright, but the edges are still cloudy. At 131° F. the entire surface is clear and bright. It is evident that at this temperature and current density the best results are obtained on polished brass cathodes in the Haring solution containing the recommended amount of chromic acid and sulphuric acid.

Current Density

Using the same solution at the temperature at which the best results were obtained an experiment was made to ascertain the effect of different current densities. At .8 amperes per square inch the deposit is clear and bright. At 1.9 amperes per sqare inch the edges of the cathodes become dull. At 3.5 amperes per square inch the whole surface of the cathode has a dense matted appearance, the edges showing a distinct burnt appearance. It is quite evident from these experiments that the current density of 1.25 amperes per square inch is probably the proper one to use at this temperature.

Another set of cathodes were run at a temperature of 113° F. for comparison. At .5 amperes per square inch the deposit is clear and bright. This is what would be expected as both temperature and current density have been decreased. At 1.25 amperes per square inch the edges of the cathode become quite dark. The same frosted appearance of the cathode is bad, as in the previous test, where a high current density is used. For example, 2.5 amperes per sq. inch.

Anode Area

There has been considerable discussion as to the relation of the anode area to that of the cathode area. When the anode area is one-half that of the cathode area in the recommended Haring bath at 1.25 amperes per sq. inch and 113° F. the surface of the cathode is clear and bright. If the anode area is increased so as to equal that of the cathode, the edges and especially the bottom have a distinct burnt appearance. If the anode area is increased fifty per cent over the cathode area the burnt edges present a different appearance. It seemingly gives a hard brittle deposit. This is what would be expected in an ordinary plating solution except that in the latter case there may be granulations.

When the anode area is equal to the cathode area there seems to be a difference in the current distribution which affects all sides of the cathode, while with the large anode area the effect seems to be at the bottom of the cathode. This is what would be expected when the anode area is larger than the cathode area. It is of interest to note that at the same current density the voltage is lower when the cathode area exceeds the anode area.

Anode Material

When different anode material is used in a solution at a cathode current density of 1.25 amperes per sq. inch a marked difference is seen in the deposit on the cathode. This is quite unexepected and of interest. It should also be noted that to obtain the current density given that different voltages were necessary.

With lead as the anode 5¼ volts were used and the cathode while bright in the center had milky edges. When steel anodes were used at a pressure of 4½ volts, the same current density was obtained as above and the cathode was clear and bright. Stainless steel contains chromium and as would be expected it offered more resistance to the current and therefore 4¾ volts were necessary to obtain the same current density. The cathode had patches that were dull while main body had a bright lustre but not as brilliant as when steel or lead was used.

Cathode Material

It is quite important that the factors governing the conditions for good deposits be carefully controlled when

cathodes of different metals are used. In the experiments made the anode was in all cases half of that of the cathode. The temperature was constant, 113° F. If brass is used as the cathode, it is evident that the current density range for a bright deposit is quite wide as very similar deposits were obtained at .65 and 1.25 amperes per sq. inch. In both cases, the pressure was 4¼ volts. In using steel as the cathode the same general conditions are noted except that at the higher current density the deposit is more clear and has a more dense appearance.

When lead is used as the cathode the effect of current density is readily seen. While this may be true in the same way with other metals, it is not as effective as with lead. At a current density of 1.25 amperes per sq. inch the lead cathode has a complete covering of chromium and at .65 amperes per sq. inch the lead is only stained. This indicates that at low current densities there is no reduction of chromium at the cathode made of lead.

Method of Introducing Cathode in Solution

There is a difference of opinion as to whether the work should be in circuit before being introduced into the solution or if the current should be turned on after the work is in the solution. In the samples shown the word "alive" indicates that the current was on when the cathode was plated, and the word "dead" indicates that the current was off when the cathode was put into the solution.

On steel there is seemingly very little difference, probably some evidence of a slight stain. With brass as the cathode the deposit is more brilliant when plated "alive." When "dead" the deposit is milky.

It has been stated that chromium can be deposited upon a chromium plated article if the cathode is dead. The experiment made indicates that either "dead" or "alive" the deposit is not to be compared with that obtained directly upon a brass or steel surface. It is evident, however, that there is less tendency for the deposit to peel or raise when the cathode is "dead."

Chromic Acid

While a standard solution made of thirty-three ounces of chromic acid, .33 ounces sulphuric acid to one gallon of water is generally recommended, in the series of experiments conducted, the effect of a lower and also of a higher concentration was made. This had an effect upon the efficiency and upon the character of the deposit which was expected.

In plating in general it has always been considered that a fairly high metal concentration will give the best cathode efficiency. Recent experiments seem to indicate that this is not entirely correct.

In the chromium solution that had practically one-half the concentration of the solution generally used a cathode efficiency of 18.9 per cent was obtained, while a solution having twice the concentration had an efficiency of only 8.3 per cent. This is in direct contrast with the efficiency of the standard solution which was 16.3 per cent. The solution was run at 1.25 amperes per square inch and at 113° F. The anodes were of lead and the cathodes brass. The anode area was one-half of the cathode area. This may be seemingly contradictory, but it should be borne in mind that the deposit was upon a flat surface. It does not follow that the dilute solution is the ideal one as other factors, such as throwing power, may be affected to such an extent that it would be impracticable to use commercially. It does, however, make an interesting experiment and produces results that should be of value for certain classes of work.

Sulphates

The sulphate content of a chromium solution exerts a greater influence upon the deposit than is generally supposed. In all probability the failure of a great number of solutions has been due to an incorrect sulphate content. If it is too low or too high, poor results are obtained. It affects distribution of the current, character of the deposit and throwing power.

From a series of experiments made, there seems to be little difference as to what kind of a sulphate salt used. The greatest effect was noted in the amount used.

In a solution containing no sulphates the efficiency is zero. Nothing but a discoloration of the cathode is obtained. At the concentration recommended by Haring, a higher cathode efficiency is obtained than with twice the amount of sulphates added. The throwing power and adherence is best in low sulphuric acid concentration.

Experiments were made with solutions containing thirty-three ounces chromic acid, .24 ounces, .48 ounces, .72 ounces, and .96 ounces of sulphuric acid per gallon. The effect of each concentration of the sulphates is noticeable. It would be difficult to put this entirely in writing and it is suggested that a study be made of the samples.

In this experiment some of the cathodes were bent at right angles and used to ascertain the throwing power. It is of interest to note that the solution containing a low sulphate content (.24 oz.) has the best throwing power.

In solutions having 66 ounces chromic acid and 1.35 ounces sulphuric acid per gallon, the throwing power is poorest and contrary to expectations the deposit on a flat surface from the same solution is excellent.

In general it has been found that the proportion of 100 parts by weight of chromic acid to one part by weight of sulphuric acid gives the most consistent results, thus confirming Haring's conclusions.

Experiments made with this solution show the efficiency to be from 4.1 per cent to 5.5 per cent. If these efficiencies are compared with those of the dilute solution previously mentioned in this paper it will be noted that there is quite a difference. The average efficiency of the more concentrated solutions is 4.7 per cent, while that of the low concentrated solutions is 14.8 per cent.

To test the throwing power of the Haring solution, experiments were made with cathodes bent at right angles using a total current upon a surface of eight square inches at ten, six and four amperes. The best throwing power was had at the highest current density.

The author wishes to thank the students of his class for their careful work and the assembling of the data which is incorporated in this paper, also Dr. Graham for his valuable suggestions.

Streaky Nickel Deposits

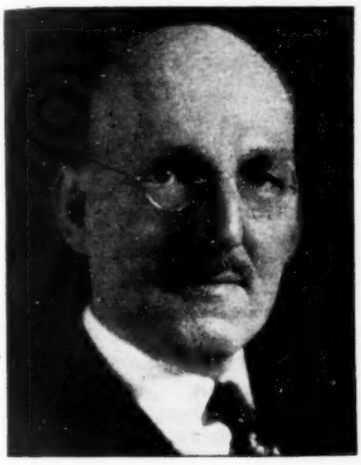
Q.—I am sending you a piece of a nickel anode and wonder if you can tell me if it contains zinc or any other detrimental impurity. I have been using standard nickel salts but have been unable to prevent getting a bright, hard, streaky deposit.

A.—Qualitative analysis of the nickel anode sent shows it to contain as impurities iron, carbon, a trace of copper, but no zinc. We do not believe that the small amount of impurities found would cause a bright, hard and streaky deposit. There may be impurities in the nickel salts that cause your trouble. If you will send a sample we will analyze the salts for you. Also send a small piece of work that has been plated in the solution. We would like to inquire whether you have made the change that we recommended when your solution was analyzed by us some time ago. —Oliver J. Sizelove.

Electrochemical Society Meeting

THE American Electrochemical Society held its spring meeting at Toronto, Ont., May 27-30, 1929. The session held on Monday morning, May 28th, was devoted to the electro-magnetic characteristics of electrochemical processes. F. T. Taylor, vice-president the Hanson-Van Winkle-Munning Company, presided at this meeting.

Among the new officers elected were Dr. F. C. Frary, president, and George B. Hogaboom, vice-president. Dr. Frary is director of research for the Aluminum Company of America. Mr. Hogaboom is an electroplating engineer with the Hanson-Van Winkle-Munning Company, and is well-known to readers of THE METAL INDUSTRY.



George B. Hogaboom

A report was made of the researches carried out at Cornell University by Professor W. D. Bancroft and Newton C. Jones on the production of a rare gas, fluorine, in commercial quantities of a thousand cubic feet at a time. This is the first time that fluorine gas has been produced in large quantities.

Professor L. F. Yntema of the University of Illinois reported on improvements in the extraction of beryllium from beryl. Much is expected from the use of beryllium because of its light weight.

The Grasselli Chemical Company presented results on its method of protecting steel from corrosion by the application of cadmium, as an electroplated coating.

Additional papers on electroplating are given in abstract below.

ALKALINE ELECTROLYTIC IRON

By STEWART J. LLOYD

In 1917-18 Estelle suggested and patented the electrolytic deposition of metallic iron from a suspension of its hydroxide in strong hot caustic soda. His results are confirmed, and extended in the present paper to various ores of iron, and a study made of the regeneration of the caustic solution by means of lime. From laboratory data, the cost of making a ton of electrolytic iron in this way, in a ten-ton plant, with power at $35.00 per hp.-yr. amounted to between $30.00 and $35.00.

THE ELECTROCHEMICAL CORROSION OF PAINTED OR LACQUERED STEEL

With Special Reference to the "Alkaline Peeling" of the Coat.

By U. R. EVANS

When a drop of salt water rests on a steel sheet, protected by an imperfect coat of varnish or paint, the sodium hydroxide, formed as the cathodic product around the edges of the drop, may produce alteration or loosening of the coat, so that it can be removed by quite gentle rubbing. The loosening may extend over an area far exceeding that originally covered by the drop, owing to the creepage of the alkali over the metallic surface. Salts which do not produce caustic alkali have comparatively little action. The peeling only occurs if there is some slight porosity or imperfection in the paint, which allows a minute amount of corrosion, but an amount of corrosion which would be harmless in its direct effect, may nevertheless cause stripping over a large area. The nature of the metallic surface affects the result, while different varnishes and paints behave quite differently from one another. It is impossible to forecast the liability of a coat to "alkaline peeling" from its appearance, or from the degree in which it protects the metal from corrosion; some coats of bad appearance resist peeling to a wonderful extent, while some coats of excellent appearance peel readily. Certain linseed varnishes, containing copal, are less susceptible to peeling than corresponding mixtures without copal. The introduction of certain pigments into the coat also reduces the danger of peeling, either by strengthening the coat, diminishing the permeability, or by keeping the metal passive. Thick coats are usually less susceptible than thin coats.

THE ELECTROPLATING OF CADMIUM FROM CYANIDE BATHS

By L. R. WESTBROOK

The cyanide bath for commercial cadmium plating is discussed in detail from the standpoint of bath composition, including the effects of variations in the concentrations of the different constituents on the electrical properties of the bath, such as cathode efficiency, conductivity, throwing power, electrode polarization, anode corrosion and operating range of cathode current densities for satisfactory deposits. The effects of the presence of small amounts of other metals in the bath are considered, especially the marked improvement in the physical characteristics of the deposit resulting from the presence of a few hundredths of a per cent of nickel, or larger amounts of cobalt or copper in the bath. The organic addition agents which function best with these baths are listed, and formulæ for typical baths are given.

THE BENT CATHODE TEST FOR DETERMINING THE OPTIMUM RATIO OF CHROMIC ACID TO SULPHATE IN CHROMIUM PLATING BATHS

By WALTER L. PINNER AND EDWIN M. BAKER

The control of the ratio of chromic acid to sulphate is most important in the operation of chromium plating baths. A rapid method of determining the proper quantity of either sulphuric acid or chromic acid, as the case may be, to be added to a bath to produce maximum throwing power is described. This method does not require a quantitative analysis of the solution for sulphate. The method was used to study the effect of chromic acid concentration on the permissible range of ratio of chromic acid to sulphate. The effects on permissible sulphate ratio of trivalent chromium, and also of iron, in a 2.5 molar chromic acid bath were also studied. Some qualitative observations on throwing power are reported.

Protecting Zinc

Q.—We manufacture several kinds of fencing from galvanized wire. Is there any lacquer or coating that can be used economically to keep the wire bright as it is all exposed to the weather?

A.—There is no way that I know of whereby the galvanized wire can be permanently protected against tarnishing when exposed to the atmosphere. You could probably retard the time of tarnishing by applying a film of lacquer but we do not believe that the result would justify the cost of this method.—OLIVER J. SIZELOVE.

Metal Cleaning Goes Scientific

An Analysis of the Mechanics of Cleaning Operations for Plating

By L. T. HOWELLS
Chief Chemist, Cowles Detergent Company, Cleveland, Ohio

METAL cleaning is essentially a two-step process, viz., the foreign matter must be first removed from the surface, and then kept from re-depositing by emulsification and adsorption.

How Dirt Is Removed

1. Dissolved directly in the solution.
2. Made soluble by saponification.
3. Made soluble by neutralization.
4. Made soluble by chemical action.
5. Dislodged by agitation (ebullition).
6. Dislodged by heat (melting).
7. Dislodged by gassing in electrolysis (electro cleaning).
8. Dislodged by colloidal physical action (peptization).

When the binder which holds the dirt to the surface is removed by any of the above actions, buoyancy and gravity help considerably in removal and heat speeds up all the above reactions.

When removed from the surface, the dirt falls into two classes, viz., that which is not held in solutions and that which is permanently suspended, or, in more common language, emulsified. The efficiency of a metal cleaner is judged by its power of converting the former class into the latter. The dirt belonging to the first class goes to the top of the cleaning tank, or to the bottom, depending upon its density. The oils are all lighter than water, and collect on the surface of the solution, forming a layer which completely coats the surface of articles drawn from the tank, resulting in unclean work. The solid particles go to the bottom of the tank, forming an undesirable insulating layer, or are forced about in solution by agitation, re-deposition on the surface of the work.

How Dirt Is Kept from Re-Depositing

The dirt in the second class is held in permanent suspension, because the particles are small enough to be absorbed or tacked on to the colloidal particles, which are uniformly distributed in colloidal solutions (soap and colloidal cleaners) and become coated with a film of the detergent solution, which prevents the particles from coming in contact with each other and uniting to form larger aggregates or clusters which are too large to be absorbed and consequently settle out or rise.

The oils which form the class of dirt which rises to the top offer the least resistance to subdivision, because of the liquid physical state in which the particles exist. They can be subdivided temporarily by agitation, and in the presence of active colloids become emulsified, as explained above. The solid particles resist subdivision by mere agitation, and must be broken down by some powerful force. It is at this point where cleaners differ widely.

Colloidal cleaners peptize dirt and form a solution which is made up of millions of peptizing particles (called colloids) that are in ceaseless motion. This action is known as the Brownian Movement, and can readily be seen under the ultramicroscope. A colloidal cleaner, through its built in physical action, has the power of breaking up large aggregates of solid dirt through colloidal bombardment into particles of the second class, which can be readily absorbed or held in permanent suspension. This phenomenon is called peptization, and colloidal cleaners peptize dirt and keep it peptized so that it is permanently absorbed, and make possible a chemically clean surface, which is the fundamental object of metal cleaning.

The oils found on parts in mechanical trades fall into two classes, viz., saponifiable and un-saponifiable.

The saponifiable oils, as the name implies, are capable of being saponified or made soluble by uniting with alkali to form soap. The un-saponifiable oils do not react with alkali, and must be kept from redepositing entirely by absorption and emulsification. Saponifiable oils are made up of animal and vegetable oils (glycerides), and their modifications such as sulfonated oil, cutting oil, etc. Unsaponifiable oils are commonly known as mineral oils, and are used alone or in conjunction with saponifiable oils. Unsaponifiable and saponifiable oils fortunately are miscible in all proportions, and can be blended to give compounded oils that are better fitted for specific processes, because the properties of each can be utilized simultaneously and the resulting properties of the blend are often more efficient than either when used alone.

In lubricating, a small amount of saponifiable oil is desirable, because it has the property of adhering firmly to surfaces, and when mixed with mineral oil, which is the better lubricant, it provides more efficient lubrication, because it causes the oil to stick to the parts of friction where it is most needed.

There are two reasons for blending oils, viz., to produce a more efficient oil, and to assist in the removal of the un-saponifiable in subsequent metal cleaning. When a compounded oil is treated with an alkaline cleaner that has the power of wetting its surface, the saponifiable is converted into soap, which, in turn, breaks up the film because of soap solubility, and emulsifies its capacity of the remaining unaffected oil.

Waxes and greases, which are simply oils in the solid or plastic state, act in exactly the same way as oil themselves, and fall into the same classes.

Solid lubricants are compounded of mineral oil or compounded oil which are dissolved in ordinary soda soap or insoluble metal soaps (lime, magnesium, etc.). In service the soap in grease lubricates and acts as a vehicle, bringing the oil in contact with the surface to be lubricated, preventing the oil from running away when melted by heat or friction. In special lubricants, graphite and other inert materials are incorporated for the purpose of increasing lubricating efficiency. In cleaning insoluble soap offers considerable resistance, and must be disposed of by absorption or decomposition. Colloidal cleaners do both and in concentrations used in metal cleaning, convert the insoluble soap into useful soluble soda soap and minute particles of the resulting insoluble salt, which are readily adsorbed and eliminated from the zone of action. This double action is highly essential, as a great many clean jobs include the complete removal of troublesome insoluble soap.

Buffing compounds are made up of an abrasive and a binder. The binder is essential in application. It holds

the abrasive on the surface where it is needed, lubricates, picks up the metal removed in abrasion and prevents burning of the metal surface by the heat generated. Binders are essentially mixtures of saponifiable and unsaponifiable solids, such as tallow and paraffin, and the ease of removal in cleaning depends upon the proportion as in the removal of oil. Some saponifiable materials saponify easier than others, and for this reason, the concentration of cleaners for various jobs depends upon the amount and kind of dirt to be removed.

The abrasive used depends upon the kind of metal and the degree of polishing or cutting required. Emery, carborundum, corundum, crocus, tripoli, chromic oxide, rouge, and lime (oxides of calcium and magnesium) are the abrasives in general use, and the fineness of the grain governs their cutting or polishing power.

Generally speaking, dirt is a matter out of place. In most all cases, solid dirts are held to surfaces by a type of dirt which adheres to both the surface and the solid particles. Whatever be the binder, it must be removed before a clean surface can be produced.

Non-ferrous metals, such as brass and copper, are extremely sensitive to oxidation or tarnishing and successful cleaning requires that no oxides shall form on the surface, because it interferes in subsequent operations such as plating.

Colloidal cleaners, like soap, through their colloidal action have the power of preventing tarnish and therefore come forth as the universal metal cleaners.

Colloidal cleaners are dependable and capable of safely removing foreign matter of all types under all conditions and therefore make practical the great advances in metal art which like themselves have fortunately been extracted from the realm of pure scientific research.

Problems I Have Met in the Electroplating Industry

A Series of Articles on Practical Problems in the Field and Their Solutions. Part I.—Changing from Copper to Cadmium.

By CHARLES H. PROCTOR
Plating-Chemical Editor

WRITTEN ESPECIALLY FOR THE METAL INDUSTRY

A LARGE plating firm in the Middle West, which specializes in rust-proof plated steel products for the metal fabricating trade, was called upon to do considerable copper plating upon large articles made of steel. It was decided to install a one thousand-gallon copper cyanide solution, to be operated at 120 degrees F. The necessary steel tank was installed with provisions for electrical control as well as temperature control. The solution recommended was the following:

Water	1 gallon
Sodium cyanide	6½ ounces
Copper cyanide	5 ounces
Sodium bisulphite	1½ ounces
Caustic potash	½ ounce
Sodium hyposulphite	1/100 of an ounce.

This solution was operated at 4 to 5 volts and according to reports, gave excellent results at the maximum amperage permissible, 20 amperes per square foot of surface area. Suddenly, after operating the solution for several months, the customer of the firm decided to cadmium plate its products in the future. The material plated with copper was used by shipbuilding firms and others. Upon the decision of the customers to replace copper deposits with cadmium, it created a condition in the plating department that could not be readily complied with, due to lack of floor space. The installation of the one thousand-gallon tank had created congestion. Finally, upon the writer's suggestion they made a change from the copper solution to a cadmium solution, based upon experiments he had made nearly two years previous, with additions of cadmium to a copper cyanide solution.

The change over was made as follows: All copper anodes were removed from the copper solution and replaced with cadmium anodes containing 2 per cent mercury as an alloy. As the cadmium metal factor, a total of three-fourths of an ounce per gallon of cadmium oxide per gallon of solution, was added in concentrated form; that is the cadmium oxide was dissolved in the minimum amount of water permissible, with a minimum of one ounce of sodium cyanide for every three-fourths of an ounce of cadium oxide. The temperature of the water used for the concentrated solution was 140° F. As soon as the addition of the sodium cyanide-cadmium oxide solution had been made, the solution was placed in productive operation. Splendid white bright deposits of cadmium upon steel resulted and have continued since the time of the change made in the solution as outlined. It is apparent that the cadmium deposits much more readily than copper from such a solution, so continuous operations are permissible so long as the cadmium metal content of the solution equals 0.64 ounces of cadmium to the 3.50 ounces of copper originally used in the preparation of the solution. It is presumed that about 15 per cent of copper deposits out, with 85 per cent cadmium, from analysis previously made with copper solutions containing 2.10 ounces copper and cadmium additions, proportionately as outlined. Salt spray tests made on the cadmium copper deposits, when the copper content does not run over a maximum of 20 per cent, gave just as good a rust resistance under a 20 per cent salt spray test for an equivalent length of time as deposits of pure cadmium upon steel.

It is interesting to know that similar results cannot be obtained with a solution prepared upon the same proportionate metal basis (copper and cadmium dissolved together in sodium cyanide), as evidently an insoluble copper-cadmium compound results, so solutions of copper and cadmium must be prepared as outlined.

The Growth of a Large Supply House

How Frederic B. Stevens, Inc., of Detroit, Mich., Grew From Small Beginnings

WRITTEN ESPECIALLY FOR THE METAL INDUSTRY

In the year 1883 a young man by the name of Frederic B. Stevens was employed by the Detroit Stove Works in Detroit, Michigan.

He did not have any particular title and his duties were many and varied. As bookkeeper, time clerk or foundry clerk, he did whatever he was ordered to do, and incidentally, he did them all very well.

Frederic B. Stevens

However, the practical side of foundry work interested him most keenly, and particularly the use of the innumerable items of supplies and equipment that are a daily necessity in the operation and maintenance of a large foundry. Even 46 years ago the Detroit Stove Works operated a large foundry, and the purchase of supplies—facings, coke, sand and equipment, etc.—was a daily problem.

That was the germ of the idea which has today become a national business, bearing the name of Frederic B. Stevens, Inc.

The start and the growth of this company is as interesting as a novel.

Forty-six years ago there were very few supply houses catering solely to the foundry business so the opportunity was not lacking. Mr. Stevens' start was really made by a connection with one of the largest and best producers of 72-hour Connellsville foundry coke. Representing them in Michigan he very soon became a factor in the coke business. Then followed the natural development of adding the sale of pig iron, as the use of coke and pig iron go hand in hand.

Until 1900 the various pig iron producers in the country sold mainly through agents, and Mr. Stevens' connections were made with some of the largest and best furnaces in the country, so that within a few years his sales of pig iron were among the largest in the Middle West.

Gradually the numerous supply items that are in daily use in every foundry were added to his line. A warehouse was established, salesmen employed, and a gradual reaching out for business was instituted beyond the immediate Detroit territory.

Naturally, the sale of foundry facings engaged his attention soon after getting started in business and until about 1900 he had been selling facing manufactured in an eastern mill. The apparent advantage of manufacturing his own facing was so obvious, that about this time he decided to build his own facing mill. This was an extremely difficult undertaking, as there were only two or three such mills in existence at that time, and

Foundry Facing Mills of Frederic B. Stevens, Inc., Detroit, Mich.

methods and formulæ were jealously guarded. However, the mill was built, and within a year or two was in successful operation, and so continues today.

His entrance into the metal furnishing field was about in the year 1895. So many brass foundries which he was serving had polishing and plating departments that it was only a natural step to add metal finishing supplies to his line of foundry supplies. So it was about that time that he decided to undertake the manufacture of buffing compositions and that was the beginning of his service to the polishing and plating industry.

The year 1901 saw the erection of the present office and warehouse building at Larned and Third Streets. This building also housed the factory, making the buffing compositions.

The growth from 1905 has been quite rapid. That year saw the acquisition of the adjoining property on Larned Street which is now devoted entirely to the manufacture of buffing compositions. Modern methods, new equipment, everything under laboratory control and automatic machinery for producing the compositions in most demand. Incidentally, this laboratory control now extends to all operations in the facing mills, so that uniformity, standardization and better products have become the order of the day.

The next step in the development of business was a very natural one. That was the electroplating field and this has gradually been developed during the past twenty years.

During that time the policy has been to manufacture or control the sale of the principal items which were offered to the polishing and plating industry. The items which were manufactured were those that could be manufactured to best advantage in their own factories. Those products of other manufacture which were sold, were selected after most careful investigation and were the best obtainable.

Eight years ago the Mitchell polishing and buffing lathes were first put on the market and a year or two later Mr. Stevens took over the exclusive sale of this line. During this period more than 1,500 Mitchell lathes have been sold to the industry.

As the personnel of the Mitchell Engineering Company included the very highest type of engineering and mechanical ability, it was decided in 1926 to enter the field of special plating equipment. The result has been the development of semi-automatic and full-automatic plating equipment.

On January 1, 1923, Mr. Stevens incorporated his business under the name of Frederic B. Stevens, Inc., the main office at Larned and Third Streets, Detroit, Michigan. Branch warehouses and offices are maintained in Indianapolis, Indiana; Erie, Pa., and New Haven, Conn.

During all of these years the Canadian business had developed to such an extent, that in 1923, this part of the business was incorporated under the laws of Canada, and the corporate name is Frederic B. Stevens of Canada, Limited. At Windsor, Ontario, there is a factory for the manufacture of foundry facings, core oils and buffing compositions, and other items. A branch warehouse and office is also maintained in Toronto, Ontario.

Main Office, Warehouse and Composition Factory

The officers of both companies are Frederic B. Stevens, President; W. H. Jos. Cluff, Vice-President; John M. Mayers, Secretary, and Lewis H. Kirby, Treasurer.

Black Finish on Aluminum by Chemical Methods

By CHARLES H. PROCTOR

Contrary to the usual belief that a satisfactory black finish cannot be produced upon aluminum, it is being done constantly in the name plate industry, and has been so accomplished for several years. For the purpose, a special type of black nickel solution is used based upon the chloride factors. In addition to the use of this special type of solution referred to, a very satisfactory black finish can be obtained in the following solution by electrolysis.

Water	1	gallon
Ammonium molybdate	2	ounces
Aqua Ammonia (30%)	0.2	ounces

voltage 5; amperage 15-20 amperes per square foot; temperature 60-70 degrees F; anode ratio to cathode 2 to 1; anodes, sheet steel; time of plating as found desirable for finish.

In cleansing any mild cleaner can be used. Any aluminum oxide resulting therefrom can be removed by a momentary immersion of the fabricated aluminum articles in concentrated nitric acid 38°, or 2 parts nitric acid and 1 part sulphuric acid 60°.

The resulting black deposit after thoroughly washing in cold water and drying out should be lacquered, if found necessary, to protect the finish. The upkeep of the solution should be based upon the original formula in a concentrated form.

Correction

In our May issue, on page 223, in the report of the work on Iron Deposition being done by the Bureau of Standards, it was stated that: "In solutions containing about 400 g/L (53 oz./gal.) of ferrous chloride, and 450 g/L (60 oz./gal.) of calcium chloride, thick smooth deposits of iron can be produced * * *."

This should have read: "In solutions containing 300 g/L (40 oz./gal.) of ferrous chloride and 335 g/L (45 oz./gal.) of calcium chloride * * *."

A New Type of Machine Bronze

The Development of Low Tin Bearing Bronzes, Which Can Be Hot Rolled, Forged and Extruded

By M. G. CORSON
Metallurgical Engineer

WRITTEN ESPECIALLY FOR THE METAL INDUSTRY

MACHINE bronzes, alloys used for mechanical parts where strength is important, but to a much lesser degree than the resistance to wear under friction, belong in a general way to the tin bronzes, with not less than nine or more than fourteen per cent of tin plus various other additions such as lead, zinc, phosphorus, etc. These alloys are quite expensive, the raw materials alone amounting to about twenty-one to twenty-four cents a pound. Their manufacture in a sound state is not a simple operation. Their strength as cast is rather mediocre; still notwithstanding all these drawbacks they form nearly the only group of copper-base materials adapted to this particular use.

The reasons for this situation may be quite complicated. Our real knowledge of what constitutes a good wear-resistant material is so limited, that all conclusions made so far may prove some day entirely premature and erroneous. Still in the absence of a carefully worked out conception we have to rely upon the old ideas of a purely descriptive nature.

It is a characteristic of copper-tin alloys, that they solidify through a very extended range of temperatures and also that all processes of chemical reaction and diffusion to which they are subject take place rather slowly. An alloy with twelve or even fifteen per cent of tin ought to represent at the end of the crystallization, a uniform homogeneous body with each grain identical to another and all layers of the same grain identical in chemical composition. Nothing of that kind is found in a cast bronze with more than six per cent tin. The cores of the grains are rich in copper, the edges rich in tin. Besides, the cast alloy at the moment of complete solidification develops a certain amount of a second constituent called the beta bronze, its proportion depending upon the tin-content; finally the beta bronze dissociates upon reaching the temperature of 510 C. and throws out a new constituent the delta. This latter is stable at the ordinary temperatures and appears as a greyish, filigreed, rather hard body (300 Brinell in the true form).

Structure of Cast Bronzes Not Reproducible in Other Alloys

This peculiar type of the structure of the cast alloys is rather unique and no other alloy system known resembles it even remotely. It results in a reasonably even distribution of a substantially but not excessively hard substance—delta bronze, within a plastic matrix of a variable hardness. The core of each grain of such matrix may be from 40 to 50 Brinell hard, while its edge must have a hardness of 60-70 Brinell. It is the general conception that the delta acts as a friction carrier and the matrix as a load carrier. Friction or grinding wears off a certain thickness of this matrix and in this manner spaces result, where the lubricator may accumulate and flow.

As stated at the beginning of this article, this conception of the reasons why a copper tin bronze exhibits superior wear resisting properties may be incomplete or even wrong. But we have no other conception and we know definitely, that the same cast bronze if thoroughly annealed at 650-750 C. will become homogeneous and simultaneously lose all its advantages as wear resisting material. Consequently we may conclude that the homogeneous alpha bronze is not suitable, in spite of a content of twelve or even fifteen per cent tin, which we may put into it, and we must adopt the above conception as a working rule when trying to develop other alloys of analogous kind.

Machine Bronzes Cannot Be Hot Worked

Not only will the application of heat destroy entirely the wear-resistance of a cast bronze, but will rob the alloy of plasticity as well. It is nearly impossible to hot work a bronze with five to seventeen per cent of tin and consequently we may not produce wear resistant articles from hot worked tin bronzes. The application of the latter is strictly limited therefore to the cast state with its inferior strength and frequently a doubtful soundness.

If, however, we go beyond seventeen per cent of tin, the alloys become well-workable hot. With this amount of tin, they represent mainly the beta constituent and this phase is rather plastic when hot in practically every copper alloy system known. On the other hand, the beta bronze does not stay stable, and on dissociating, about 510 C., it develops an excessive amount of the hard delta. For this reason a bronze of this kind has too little strength and plasticity in the cold state and cannot be used for machine parts. In addition its price is too high.

The Beta and Alpha Plus Beta Brasses

A group of alloys which work well in the hot state are the beta brasses. These contain about thirty-three to fifty-three per cent zinc at a temperature of 700 C. and only forty-four to forty-nine per cent in the cold state. An alloy with say forty-one per cent zinc when worked hot and cooled down represents a mixture of alpha and beta brasses. The field of their applications is enormous (yellow brass), but the hardness difference between alpha and beta (50 and 100 Brinell respectively) is too small and the texture too dense. For these two reasons their ability to act as wear resistant machine parts is rather mediocre.

Both alpha and beta brass dissolve a certain amount of tin without changing the type of their grains. Again alpha tin bronze as well as beta tin bronze dissolve a certain amount of zinc. The delta bronze representing the practically pure intermetallic compound Cu_4Sn is hardly apt to dissolve any additional amount of zinc.

More Complex Alloys

But as soon as considerable amounts of zinc are added to a tin rich bronze, or considerable amounts of tin to a high zinc brass, the main constituents of both become saturated and new constituents are formed. Consequently, in the hot state, we may expect to find mixtures of a ter-

nary alpha (containing both zinc and tin) with a ternary eta bronze and a ternary beta brass. The proportions of the three constituents just named may be rather variable. In some compositions one or another may be entirely absent. When alpha is the "absentee" we are bound to get a mixture of the two betas and there is no reason why such mixtures should not be amenable to hot work, just as the plain binary betas are. Consequently ternary compositions must exist which are well workable hot.

But, when arriving at the normal temperature, such alloys must again represent mixtures of a ternary alpha-far-reacher in zinc and tin as the one possible at high temperatures, with a ternary beta brass and the delta bronze. Now should the beta brass be absent as it may in certain compositions, and should the amount of delta at the same time be well adjusted and distributed, a structure must result that would be quite analogous to the cast machine bronzes (with the exception of "coring") of the usual type, and which should be superior to the high tin bronzes in respect to price, uniformity of results and ability to work hot by forging, rolling or extrusion.

The New Group

Reasoning along these lines the author came to find a group of alloys well satisfying the above prerequisites. So Figures 1 and 2 show the structure of an alloy located well-nigh at the limit of high tin alloys entering in our group. In the cast state the delta nearly predominates. It forms a continuous network with the alpha present in the shape of islands. In this state the alloy has a hardness of 165 Brinell and is too brittle to be useful.

At 700 C. the same alloy is composed of the two ternary betas. This is shown in our Figure 3, pertaining to the forged alloy, water-quenched from 700 C. The beta bronze shows a beginning transformation (angular striation). Under the same conditions a plain beta bronze would present a martensoidal structure. The presence of zinc in the ternary beta bronze slows down its eutectoidal transformation.

Finally Fig. 4 shows the structure of the heat treated forging. Here we see the gray delta and the light alpha, the nature of the latter being established by twinnings occurring here and there. In this case the amount of delta is somewhat excessive and it manages still to form continuous chains. In alloys containing less tin the delta becomes reduced to isolated crystals. The Brinell hardness corresponding to this figure has been 120 and the alloy possessed a considerable ductility.

Figs. 5 and 6 illustrate our conception of the processes taking place in such ternary bronzes, otherwise called "calchoides." Alloys the composition of which fall within the field occupied by the two betas only (in Fig. 5), are well workable hot. A comparatively small part of the same field will be composed of the ternary alpha plus delta bronze when arriving at a normal temperature. Of this, still a smaller field will embody the desirable relation between the alpha and the delta. This smaller field embraces the compositions of the recently developed machine bronzes.

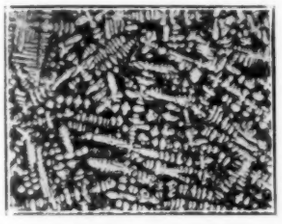


Fig. 1.—Structure of a ternary bronze with 27% zinc and 8% tin as cast. X100.

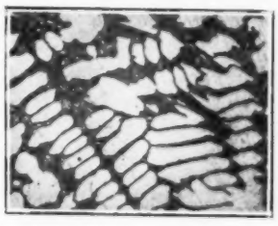


Fig. 2.—Same as Fig. 1 but at 500 diameters.

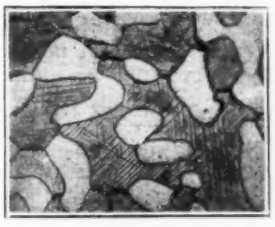


Fig. 3.—Structure of the forged alloy water quenched from above 700° C. X500.

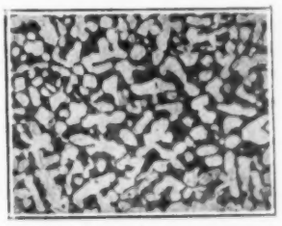
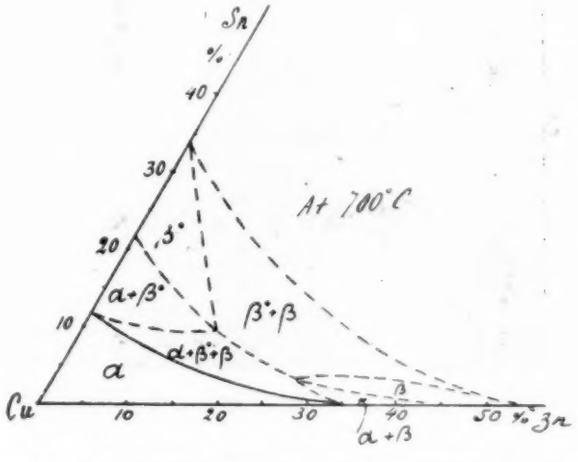


Fig. 4.—Structure of the forged and heat treated alloy. X100.

(Fig. 1-4 reduced by 50% in reproduction)



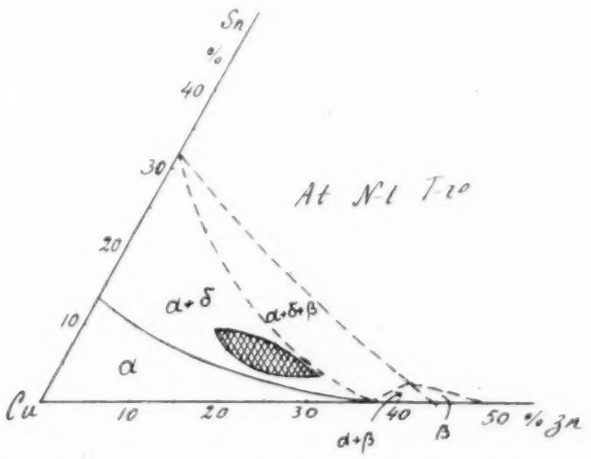


Fig. 5 (left) gives a general idea about the structural elements of ternary copper-zinc-tin alloys at 700° C. Alloys in the range of beta bronze plus beta brass are workable hot. Fig. 6 (right) shows the structure of the same alloys at normal temperatures. The small oval field within the alpha plus delta range embraces the compositions which are workable hot and have a desirable structure insofar as alpha is prevailing and the delta (the hard constituent) forms isolated islands. This field represents the alloys forming the subject of the present article.

(The dotted field boundaries represent only generalizations. Their actual positions are now being studied).

Methods of Joining Aluminum and Its Alloys

Fluxes—Welding Materials—Preparation of the Metal—Execution of the Weld—Electrical Welding—Cast Welding—Riveting Aluminum—Conclusion*

By A. EYLES

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WRITTEN ESPECIALLY FOR THE METAL INDUSTRY

Cast Welding

THE art of cast welding or burning, sometimes termed "burning-on," has been known and practiced for many centuries. It was employed in Japan several centuries ago, where in bronze foundries the vases and ornamental objects were cast in a very simple form, the handles being burnt on.

This method is often carried out at the present time in foundries and engineering plants where modern welding methods are not employed and is mostly used for jointing fractured crankcases, gearboxes of automobiles and broken parts of machines.

Small pieces that have broken off a large casting are sometimes reconditioned by this process, which is also applied to repairs that must be made as soon as possible. For such work, this method of cast welding or burning is generally considered economical, especially where a replacement requires a lot of machining.

Briefly, the process consists in pouring molten metal of approximately the same composition as the work over the parts to be repaired or joined until they are fused together, stopping the flow of metal and allowing it to cool, superfluous metal being afterwards removed.

With aluminum alloy castings, the essentials for good work are: Properly prepared molds in which the molten metal may be poured; the parts to be firmly secured in order to avoid distortion during pouring; provision that the initial pouring may run out by suitable gates, after passing over and heating to fusing point the surfaces to be welded, an excess of metal being allowed; the surfaces where the weld is to take place must be thoroughly cleaned, also roughed; and provision of tall gates to provide a pressure that penetrates the oxide film on the metal surfaces to be joined. The advantage of tall gates is that aluminum alloy castings readily oxidize upon exposure to the atmosphere, and the metals containing it become "drossy" as they run. A long gate retains this dross, and it does not enter the weld. The pouring should be done methodically to insure a strong weld.

As soon as the weld is made it should be judiciously protected so as to secure an annealing effect and to minimize cooling strains. In many cases the welding job may be left undisturbed until quite cold. Slow cooling after cast welding is just as important as slow preheating. By this method thousands of successful repairs to aluminum alloy castings have been made, and where the pouring of the molten metal is carefully done and proper attention is paid to the points referred to, a fractured part can be made fully as strong as the original casting. It is not claimed, however, that a burn-on is the best method of repairing or joining broken aluminum alloy products, but it can be said with truth that it is an effective and economical method to employ in foundries where modern welding equipment is not available and in cases when a quick repair is necessary.

*Parts 1, 2 and 3 of this article were published in our issues of September, 1928; March and May, 1929.

Riveting Aluminum

Riveted joints in aluminum and aluminum alloy sections, sheets and plates, are remarkably efficient if the riveting is judiciously done. It is sometimes stated that aluminum cannot be riveted so well as other metals, on account of the softness of the metal allowing the rivets to draw out or work loose, thus giving rise to leakage—especially when subjected to excessive vibration, temperature variations, etc. Such statements, however, are inaccurate, for by continued rolling in the manufacture of aluminum and the age hardening of certain aluminum alloys, hard rolled sheets and plates are obtainable. Admittedly, aluminum does not harden to that degree of hardness obtained in iron and steel. However, the more important types of riveted joints are as applicable to aluminum and certain aluminum alloys as to most other metals.

To be successful in riveting joints in aluminum, it is desirable to forget all one knows about riveting such metals as iron and steel, as aluminum will not withstand the ill treatment to which iron and steel can be subjected. Some few years ago the writer assisted in the construction of a large number of all metal railroad passenger cars, 63 ft. 4½ in. long, 12 ft. 4½ in. in height. The roof plates and panels consisted entirely of aluminum sheets, Nos. 16 and 14 gage (0.064 in. and 0.080 in.). Many of the aluminum sheets were formed to the different curvatures required, these being afterwards riveted to aluminum alloy sections. In the construction of each car approximately 10,000 aluminum rivets were used. The selection of aluminum rivets should be determined by the work on which they are to be used. Diameter and length are alike important, for rivets that are not of the correct diameter and length will result in unfilled

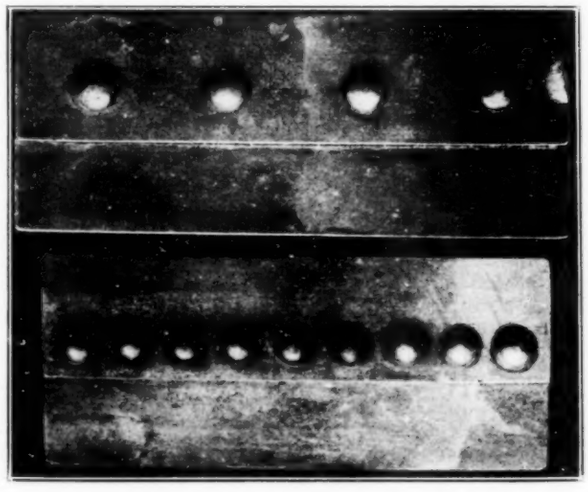

Fig. 11—Examples of Aluminum Sheet Riveting

holes, in eccentric or unfilled heads, or in difficulty in driving, any one of which conditions may produce imperfect and inefficient joints. Riveting, if done rightly, is an economical and satisfactory method of jointing aluminum and aluminum alloy sheets in large construction work. The riveting is invariably done cold, and the rivets should be of the same metal as the sheets and sections to be joined if it is desirable to avoid electrolytic action. Strong aluminum alloy rivets, such as duralumin, lautal, etc., may be obtained in the annealed condition and then be "normalized" or finally heat treated, and stress on them is not severe, it is possible to use them in the finally heat-treated condition. Should any signs of cracking be observed in the rivet head on hammering up, it is necessary to heat treat the requisite quantity before riveting further. Immediately after quenching, the rivets are soft and can readily withstand the deformation of riveting, and after the work has been done the rivets will then age harden in situ.

An important factor in riveting aluminum and aluminum alloys is that the rivets must have ample clearance in the holes, to allow for spread in riveting. A greater overlap than in the case of sheet steel should be arranged,

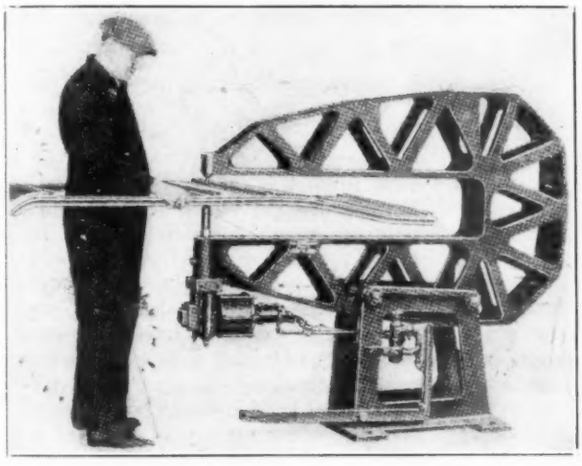

Fig. 12—New Type Hanna Riveter for Aluminum

otherwise the extension of the metal will cause an irregular or wavy edge.

For single riveted lap joints in aluminum sheet 1/32 in. to ⅛ in. in thickness, a safe rule for the amount of lap is not less than 3½ times the rivet diameter. As with other metals, the laying out and punching of the holes in the sheets, however accurately performed, rarely give the alignment of holes that is needed; hence the holes frequently have to be reamed. Where the holes are not reamed, it is essential that the inside surfaces of the holes should be parallel to each other, without undue overlapping, before beginning to rivet, because on account of their soft nature aluminum rivets do not readily draw through the overlap in the holes, as do iron or steel rivets when riveting thin metal sheets. When riveting aluminum work the hammering should, however, be somewhat lighter than when riveting iron or steel, and the blows should be delivered in a uniform manner. Too many light blows must be avoided or else the metal will receive a peening action and in consequence be severely overworked before the head has been correctly formed. It is desirable that the head of each rivet rest solidly on iron or steel stakes or other suitable tools, and, whenever practicable, a good plan to adopt is to use the thickest part of the tool for riveting operations, in order to gain solidity. Riveting is usually done by hand or small riveting machines on aluminum sheet or products up to ⅛ in. thick, also on aluminum rivets up to ¼ in. in diameter, but above these dimensions, high speed riveting hammers or pneumatic riveters are used satisfactorily. Regarding the pitch of the rivets, the character of the work is the determining factor. It is obvious that if a riveted joint is to be watertight, the rivets must be closely spaced. In general, somewhat closer spacing is necessary with aluminum than with other commercial metals.

The Hanna riveter is shown in the accompanying illustration. This machine was developed due to the ever increasing use of aluminum rivets in coach and motor body construction. It has a reach of 48 inches and a 10-inch gap, which allows work with comparatively wide flanges to enter between the jaws and permits riveting operations in the central portions of intricate pieces of work. When the ram is operated under an air pressure of 100 pounds per square inch, with die stroke of 1½ inches, aluminum or aluminum alloy rivets of ¼ inch diameter can be driven easily. Possible ram speed is sixty strokes per minute. The pressure exerted by the ram is predetermined, and its uniform pressure for a considerable portion of its strokes results in perfectly driven rivets regardless of variations in the thickness of the parts being riveted. With the machine arranged dies vertical, cylinder down, as shown in the illustration, the rivets are headed on the under side. Rivets may be inserted well in advance of the riveting, so that interruptions to insert rivets are reduced to a minimum and, consequently, the operation of the riveter becomes almost continuous. The riveter is operated by a foot-actuated valve, thus leaving the workman's hands free to handle the work. The machine is offered in a wide variety of sizes, for either portable or stationary use.

Harmful Gas from Brass Solution

Q.—I am operating a brass solution made as follows:

Water	1	gal.
Copper cyanide	1½	ozs.
Zinc cyanide	1½	ozs.
Sodium cyanide	8	ozs.
Sal ammoniac	1½	ozs.
Caustic soda	1	oz.

This solution plated fine for a time. Later, I discovered that some of the material I had been adding did not look very good. I then noticed crystals in the bath. I stopped using the defective chemical and got some that was good. However, there has been considerable gas coming from the tank. This has caused irritation in the nose and sight bleeding at times. Was this caused by the defective cyanide? The anodes turn dark while plating but afterward turn clean again. I have been plating cast iron which has been tumbled in sand. Some of the sand stays on them. I strike them in nickel for 10 to 15 minutes, then plate in brass solution for 40 minutes. Our water has a lot of lime in it. How can I get rid of the gas?

A.—When brass solutions are operated at high current densities, considerable gas is given off at the cathode. This gas is very irritating to the membranes of the nose and, when inhaled, is dangerous. The tank should be equipped with a good exhaust system.

An excess of free cyanide and a low metal content are factors that cause an extra amount of gas to be given off, so if you will stir solution thoroughly and take a 2 oz. sample and send it to us, we will analyze it and check these factors for you. —Oliver J. Sizelove.

The Electric Arc Furnace in the Brass Foundry

Practical Melting with Electric Arc Furnace in General Jobbing Brass Foundry—With Special Emphasis on Operation, Maintenance and Cost—Conclusion*

By J. B. MEIER
Vice-President, F. and H. Foundry Company, Newark, N. J.

A PAPER READ AT THE MEETING OF THE AMERICAN FOUNDRYMEN'S ASSOCIATION, CHICAGO, ILL., APRIL 8-11, 1929.

IN order to best understand the cost of melting it has been subdivided in its various parts.

(a) Electric Power

The item of first importance is the electric power. This item presents a little difficulty in analyzing because of its complicated nature. The power is purchased as primary power, the rate being independent of the connected load,

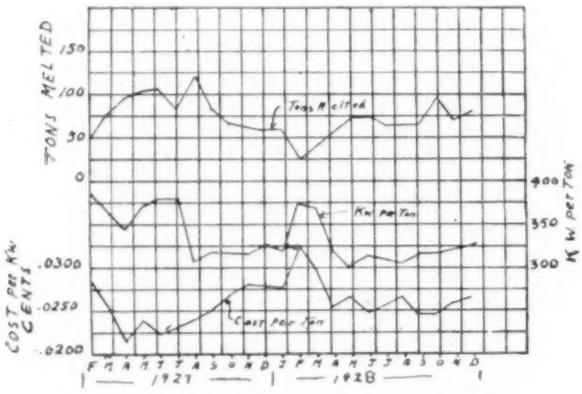

Fig. 3—Tons Melted, Kw Per Ton and Cost Data

but varying with the maximum demand of any 5-minute period during the day. This works a considerable handicap on the use of two furnaces, where a large jump in the demand occurs as soon as the second furnace is operated for five minutes. In addition, the power charge varies with the total consumption, as shown by the data on chart of Fig. 4. These curves in Fig. 4 are plotted against standard efficiency for various numbers of heats, for different demand charges.

From experience we know we can get sixteen heats in 9½ hours with one furnace. We also know the first heat takes about 35 kw. more than those after the fourth. The second heat takes about 15 kw. more and the third about 5 kw. Therefore, to take out four or five heats is not very efficient. To determine just where the second furnace should come in we plotted the curves of Fig. 4. These curves show that if we take sixteen heats our power cost is about $0.0268 per kw. hour, if we take seventeen heats by running one in the second furnace, our rate immediately jumps to $0.0320 per kw. hour. We find it more economical to run the oil furnaces up to about twenty-one to twenty-two heats, which is shown by the shaded area.

*Part 1 was published in our issue of May, 1929.

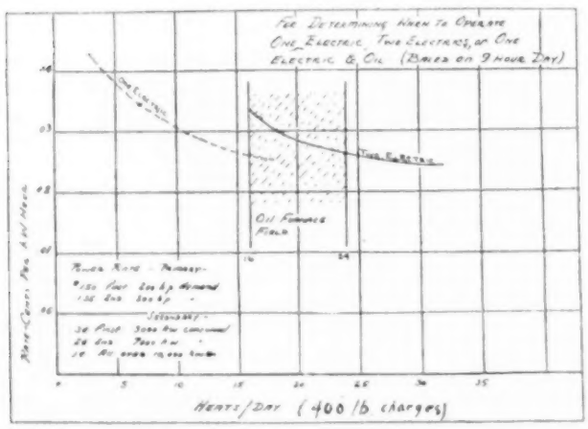
For Determining When To Operate One Electric, Two Electrics, or One Electric & Oil (Based on 9 Hour Day)
Oil Furnaces Alone
Heats/Day (400 lb charges)

Fig. 4—Chart Developed to Determine When to Operate Furnaces

From a study of the chart of Fig. 3 we find that the cost per kw. varies closely with the tons melted per month. Some explanation of these curves will make this more clear. In the beginning of 1927 the cost per kw. hour decreased until May when it jumped up until the end of July. This radical jump was due to the installation of two silicon-carbide base linings, which caused enormous heat loss and consequent power consumption. Upon removal of these linings the cost dropped, rising gradually as the tonnage dropped, reaching a maximum at February, 1928. From then on it maintained a fair level with a gradual slope, due in part to a change in the casting wall thickness, and introduction of nickel brasses, both requiring higher temperatures than previously. The cost per kw. hour has increased in 1928 over 1927 by increased demand charges due to the installation of a larger transformer and about 40 hp. additional motor load, making a larger demand charge with a smaller increase in power consumed. Reference to Table 1 will show the average kw. per ton; the average cost per kw. and the product of the two, which is the power cost per ton.

(b) Labor

The next item is the labor. The labor on the electric furnace required a reliable man of probably a higher order than for oil, for a careless man can ruin a transformer costing about $1,000 very quickly. But the work is so much less laborious and practically no heat, that a higher grade man can easily be induced to stay on the job. We have had the same furnace men ever since the installation, being negroes, used on the oil furnaces previously used. With oil we always had a higher turnover and much absence and tardiness. On the electrics this is practically nil. To melt with oil our labor cost us on the average of $3.75 per ton. Compare this with $2.30 in Table 1. Further efficiency is obtained by paying a bonus to the operator as follows: Fifty cents for fourteen heats, 75 cents for fifteen heats, $1.00 for sixteen heats. This urges the operator to get out the maximum amount of metal. The bonus is only paid if it is within 9½ hours. For him to succeed he must run the furnaces efficiently.

(c) Fuel Oil

This item averaged about fifteen gallons per ton metal melted for 1928. On test, this figure was only 7½ gallons per ton, but a fair production rate would be 10 gallons per ton. But owing to carelessness in cutting down the

oil to the proper mixture, or allowing it on too long, it is about 50 per cent higher than it should be. Nevertheless, due to the fact that this item can only be checked once a month, it does not lend itself to close check, which is one of the chief advantages of electric melting, for every day the day's efficiency can be determined and pressure brought to bear at once to correct it.

(d) Electrodes

The next item is electrodes. For the past year, this averaged 4½ pounds per ton melted. The type of metal and carelessness on the operator's part are the chief factors involved. Rocking when improperly charged causes breakage. Improper condition of the porthole also causes breakage. Clamps which leak contribute to the rapid consumption of electrodes. Improper arcing also burns up electrodes unnecessarily. With a conscientious operator it should not be difficult to bring it down to four pounds per ton, for we have done it several months.

(e) Crucibles

Reference to Fig. 5 will demonstrate the ladles used. Considerable economy in fuel oil, maintenance of temperature and crucibles are obtained by this type of pouring. The average number of heats from the crucibles was 225. Some have gone to 400, and many 350. The chief loss is due to carelessness in cleaning the crucibles after pouring, as frequently a hole is poked right through and not patched. The metal then gets in back of the crucible and quickly cracks it or makes it too heavy to carry. Considerable advantage is derived from this ladle through greater heat holding qualities, very little drop in temperature occurring.

(f) Linings

Reference to the chart of Fig. 2 will show the effect of the lining life on the kw. per ton. It can be readily seen that up to about 100 tons the slope is nearly level, after which it rapidly changes, due to the fact that not only does it take more power, but less heats are taken out because it takes more time, which exaggerates the average

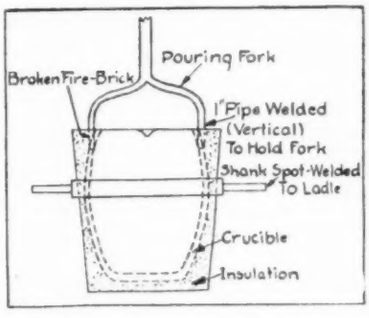

Fig. 5—Type of Crucible Ladle Used

kw. per ton still more. The tonnage per lining averaged 162 tons, which is about eight hundred 400 pounds heats.

(g) Patching Material and Supplies

The chief cost involved here besides the patching material is the replacement of cables. It seems some improvement could be made in this line, as it requires replacement of cables about once a year, due to the bending action, which breaks the strands. Reference to Table 1 gives this cost.

Table 1—Summary of Melting Costs Per Ton Melted

Electric power	321 kw. @ $0.0259 =	$ 8.35
Wages	@ 60 cents hour =	2.30
Fuel oil for ladles	14.9 gallons @ 7 cents =	1.04
Electrodes	4½ lb. @ 0.22 60/100 =	1.00
Crucibles	$7.00 per crucible—22½ tons =	0.29
Linings	@ 162 tons/lining =	0.39
Patching and supplies	=	0.17
Sub-Total		$13.54
Metal loss, 2.4%	@ 12 cents per lb.	5.76
Semi-Total		$19.30
Unforeseen: Transformer burnt out		1.20
Grand Total		$20.50

Table 2—Overhead Costs on Melting Per Ton Melted

Supervision	$0.20
Interest on investment	0.65
Depreciation (10 years)	1.08
Taxes $3.78/$100	0.25*
Total	$2.18

* Taxed at 60% of value.

(h) Metal Loss

Every one is usually interested in this item, but it is impossible to compare it accurately, even in the same shop, if scrap is used, because there is such a large variation in loss in different scrap. In the writer's own experience brass tubing contained 18 per cent scale alone, and lead-covered cable contained 8 per cent cotton insulation. It is therefore extremely difficult to convey to outsiders any idea of the loss. However, the only comparison which can guide to some extent is the metal loss in the same foundry under oil and under electric melting. The average of the three previous years of operation under fuel oil was 5.7 per cent. The past year under 85 per cent electric melting and 15 per cent oil melting the loss was 2.4 per cent. Naturally, this is no small item, and is one of the chief justifications for electric melting.

Table 1. Totaling these various items we find a cost of $13.54, exclusive of metal cost, compared with a similar cost of $17.50 under fuel oil. If we charge the entire cost of the new transformer in one year it would be $14.74, against $17.50, or, roughly, $2.75 net saving in operating cost. Including the metal loss it is $20.50, against $31.10, for fuel oil, or a net saving of $10.60, or 34 per cent less than fuel oil. While it is reasonable to assume that the fuel oil costs are too high, at the same time it must be remembered that both methods have had the same supervision, but that one lends itself more readily to supervision than the other.

In Table 2 is given a brief estimate of the general costs which properly could be charged to melting.

Soldering Zinced Steel

Q.—Is it possible to solder electro-galvanized strip zinced steel?

A.—Electro-galvanized strip zinced steel can be soft-soldered by using a muriatic acid as a flux.

—P. W. Blair.

Pattern Metal

Q.—I would appreciate very much having your opinion of a white pattern metal which consists of: 16 lbs. tin; 3 lbs. lead; 10 oz. antimony; 3 oz. zinc.

Would you consider this mixture superior to half tin and half zinc and a little antimony?

A.—Half tin and half zinc we consider to be the better mixture of the two for metal patterns; first because half tin and zinc has the minimum amount of shrinkage and has a high tensile strength; second, it is easy to alloy, and cast sharp when poured at a low temperature, which is the proper temperature to pour pattern metal to obtain clean smooth castings. —W. J. Reardon.

Proposed Duties on Metals and Metal Products

BELOW is a summary of the most important changes in tariff rates affecting the metal and plating industries, as proposed in the bill presented in the House of Representatives by Chairman Hawley of the Ways and Means Committee in Washington, D. C., on May 7, 1929.

Chemicals

Nitric Acid—½c per pound (new provision).

Alkohol, (methyl or wood or methanol). Present 12c a gallon; new 18c.

Chalk or whiting or paris white (dry, ground or bolted). Present 25 per cent ad valorem (new ¼c a pound).

Calomel, corrosive sublimate and other mercurial preparations. Present 45 per cent ad valorem; now 22c a pound and 25 per cent ad valorem.

Sodium nitrate, present 3c a pound; now 4½c.

Sodium phosphate, except pyro phosphate, containing by weight less than 45 per cent of water. Present ½c a pound; new 1c.

Sodium phosphate not specially provided for. Present ½c a pound; new 2c.

Metals and Metal Products

Silicon aluminum, aluminum silicon, alsimin, ferrosilicon, aluminum and ferro-aluminum silicon, 5c a pound (new).

Barium, boron, calcium, columbium, niobium, strontium, thorium, titanium, uranium, vanadium, zirconium. Less of two or more of these metals or alloys not specially provided for of one or more of these metals with one or more of the metals aluminum.

Chromium, cobalt, copper, manganese, nickel or silicon. 25c ad valorem (new).

Wire rods valued over 4c a pound. Present rate 6/10c per pound; new rate 20 per cent ad valorem.

Woven wire cloth. Present rates 35 and 40 per cent ad valorem; new 40 to 50 per cent.

(New language provides that fourdrinier wires and cylinder wires suitable for paper making machines and woven wire cloth suitable for use in the manufacture of fourdrinier or silicon wires pay 55 per cent ad valorem).

Boron carbide, chromium carbide, vanadium carbide, chromium-nickel, chromium silicon, chromium vanadium and manganese copper. 25 per cent ad valorem (new).

Table, Household, Kitchen and Household Utensils. Provision that when plated with platinum or gold these shall pay 65 per cent ad valorem and when plated with silver, 50 per cent.

Aluminum foil less than 6-1000th of an inch thick. Present 35 per cent, new 40 per cent.

Gold leaf, unmounted. Present 55c per 100 leaves; new 82½c per 100 leaves.

Gold leaf, mounted. Present 55c per 100 leaves; new 6¾c per 100 square inches plus 25 per cent ad valorem.

Tinsel wire. Present 6c a pound plus 10 per cent; new 6c a pound plus 20 per cent.

Lame or Lahn. Present 6c a pound plus 20 per cent; new 6c a pound plus 30 per cent.

Bullions or metal threads. Present 6c a pound plus 35 per cent; new 6c a pound plus 45 per cent.

Beltings and other articles made of tinsel wire. Present 45 per cent; new 55 per cent.

Woven fabrics, ribbons, etc. made of the foregoing. Present 55 per cent; new 65 per cent.

(An entirely new paragraph in the metals schedule provides that illuminating or lighting fixtures, lamps, lamp bases, candelabra and candlesticks, finished or unfinished, not specially provided for, if wholly or in chief value of base metal or alloy, pay 50 per cent ad valorem; if wholly or in chief value of, or plated with platinum, gold or silver, 65 per cent ad valorem).

(Another new paragraph provides that phosphor copper pay 3c a pound).

New types. Present rate 20 per cent ad valorem; new 30 per cent.

Print rollers for printing, cutting and stamping designs. Present 60 per cent; new 60 to 72 per cent.

Articles not specifically provided for composed of platinum, gold or silver. Present 60 per cent; new 65 per cent.

Articles not specifically provided for composed wholly or in chief value or iron, steel, lead, copper, brass, nickel, pewter, zinc, aluminum or other metal. Present 40 per cent; new 50 per cent.

Core Binders

Q.—We are interested in obtaining full information relative to core binders of corn base, and would appreciate your supplying us with any data you may have.

A.—Core binders of corn base are of two types, a water soluble oil or syrup, consisting principally of glucose in water solution, and a dry, flour-like product, consisting of dextrin and corn starch. Cores made with either of these binders must be baked very carefully to avoid a tendency of the baked cores to absorb moisture from the mold or from the air. Both find very satisfactory application in certain types of work.

We regret that we cannot supply statistical information; there seems to be none available.

However, it is probably safe to say that linseeed oil and various mixtures of linseed oil with rosin, mineral oils, etc., are used in considerably greater quantity than the corn-base binders. H. M. St. John.

Heat Treating Bronze

C. H. Bierbaum, vice-president of the Lumen Bearing Company, Buffalo, N. Y., read a paper before a recent meeting of the Hartford chapter of the American Society for Steel Treating, on the methods of improving bronze. These methods were as follows:

1. The resistance to corrosion may be increased by forming a solid solution, which is more highly resistant than an alloy with two or more phases.

2. Eliminate porosity. For example, heat treatment of the mixture 93 copper and 7 tin will overcome the slight porosity which is often present in the as cast condition.

3. Increase of tensile strength and resistance to impact. Copper 89, aluminum 10, iron 1, can be greatly improved by the correct quench and draw.

4. Increase its bearing value by precipitating hard crystals in a fine-grained soft matrix.

THE METAL INDUSTRY

With Which Are Incorporated

The Aluminum World, Copper and Brass, The Brass Founder and Finisher, The Electro-Platers' Review

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Editorial

Another Brass Merger

ON page 303 of this issue is a complete report of the acquisition of the Chase Companies of Waterbury, Conn., by the Kennecott Copper Corporation. The Kennecott company is said to control an annual output of about 1,000,000,000 pounds of copper per year. According to these same reports the capacity of the Chase Companies, when their new plant in Cleveland is completed, will be about 150,000,000 pounds of metal products per year. It is clear, therefore, that the Kennecott Corporation has covered only a small part of its own production.

The Chase Companies, however, have no small business as they are said to produce a sixth of the total brass made in the United States. The history of the Chase Companies, published in THE METAL INDUSTRY for March, 1923, points out that they own the Chase Metal Works, Waterville Machine Company, Chase Rolling Mills, Waterbury Manufacturing Company, and the Chase Brass and Copper Company which owns all of the warehouses of the former U. T. Hungerford Brass and Copper Company. F. S. Chase, president of the company will continue to direct its operations and retain his present staff of officials. Of course, the Kennecott corporation will be represented on the Board of Directors.

One or two things stand out in this merger. It seems to be only a question of time before all of the large brass fabricators will be taken up by the copper producers. The Anaconda Company has the American Brass Company; the American Smelting and Refining Company controls the Republic Brass Company and the General Cable Corporation which are a combination of a number of wire and cable mills. Rumors have been abroad for months that the Scovill Company and the Bridgeport Brass Company have been approached and that negotiations are still pending. It is noteworthy that the American Smelting and Refining Company is affiliated with the Kennecott company, both companies having the same men on their boards of directors.

The Anaconda company seems to have started something, seven years ago, which will not stop until the entire red metal fabricating business is in the hands of copper producers. The outcome of these vertical combinations and their eventual effect upon the metal manufacturing industries is something that no one can predict at this time.

Attend the Platers' Convention

THE seventeenth annual convention of the American Electroplaters' Society will be held in Detroit, July 8-11. Detroit is a great center of electroplating work and an eminently suitable city for this convention. The Detroit Branch has made extensive preparation, stressing educational and technical features but not omitting adequate entertainment. It now remains only for the members of the Society to attend.

Year after year the attendance at the annual conventions has been growing. Year by year the plating industry has increasingly recognized the importance of the American Electroplaters' Society and the value of these annual conventions. Each branch sends its delegates of course, but these delegates should be only a small proportion of the total attendance. Electroplating foremen and superintendents from all over the country travel to these meetings and bring their wives, for it is more than a technical meeting, important as that is. It is a gathering of brothers in the craft who have only one object, to improve their industry and thereby improve themselves. The annual convention is a meeting of old friends. They work together and play together, but their play is shot through with "shop talk." The meetings last all day but this is not enough for them. They talk shop at dinner and they talk shop in the evenings. Everybody is hunting for more information and everybody is willing to give in return what he has.

A glance at the program (see page 263 of this issue) will show at once the importance of attending this meeting. The sessions include papers on plating control, metal cleaning, brass plating, iron plating, cadmium, chromium, spotting out, nickel, finishing costs, the plating of non-metallics. It will take months before all of these papers can appear in print either in the "Monthly Review" or in other technical journals, but those who are present will know all about them at once.

So we say to all members and even those who are not members of the A. E. S. who are in any way engaged, directly or indirectly in plating, that they should not miss this convention. The best investment a company can make is to send its electroplating executives to Detroit from July 8 to 11.

The Secondary Metal Industry

A RECENT report from the Bureau of Mines points out the size and scope of the business of collecting waste materials. They estimate that it involves the collection, sorting and shipment of material to the extent of more than a billion dollars yearly. Nearly 500,000 tons of secondary copper are recovered annually in the United States from scrap copper, brass and other alloys. Almost 300,000 tons of secondary lead are brought back from old pipe, cable, battery plates, acid tank linings, babbitt, solder, terne metal, type metal, white brass and white metal drosses. Secondary zinc is reclaimed in large quantities by redistillation, sweating and re-melting. Much of the zinc is recovered in the manufacture of chemical compounds, such as chloride, lithopone, etc. Secondary tin is the basis of an enormous industry. Detinning in the United States is done largely by the electrolytic

process, yielding a chloride but much tin is recovered in metallic form from drosses, and in alloy form from solder, babbitt, pewter, electrotype, etc. Secondary antimony is recovered in alloy form from hard lead drosses, babbitts, etc. Aluminum and aluminum alloys come back to the extent of about 50,000 tons a year. Nickel is recovered as metal, alloys and salts to over 3,000 tons a year. Gold and silver and other precious metals run into enormous values annually in secondary form. Silver is recovered from photographic waste in the still and motion picture industry.

The point of all these figures is that the scrap metal industry is no longer a "junk" business. It is enormous in size, diversified in products and is undergoing reorganization and stabilization like other large industries. A report from the Bureau of Mines states that it has advanced in efficiency, honesty and usefulness and is growing rapidly.

Secondary metals have no longer a stigma. They are known to be useful for certain purposes and increasing knowledge of their properties makes them less liable to fraudulent use. Bolstered up as the industry is by the Non-Ferrous Metal Institute, the White Metal Smelting Association of Chicago, the Salvage Division of the National Association of Waste Material Dealers, and the numerous technical journals and societies, who are taking an interest in secondary metals, the industry is well on its way to complete stability.

Tin Stabilization

THE record of tin prices in the last year or two has been decidedly discouraging to producers, and of course, traders. Ranging now from 43 to 44 cents a pound, the price is in one sense a boon to consumers: in another sense, however, it is not at all in a satisfactory position.

No industry can continue indefinitely if the prices for its products are too low. The eventual result is bound to be a cessation of production with consequent rises, very often sharp, as in the recent market for copper.

There is under way, a program of joint action by tin producers throughout the world, to stabilize prices and adjust the scales between production and consumption. According to John Howeson, chairman of the Anglo-Oriental Mining Corporation, Ltd.: "It is the policy of Bedlam to dig tin unnecessarily from the earth to sell at any price to any customer and so precipitate a price crisis. So long as industry remains a jumping-off place for speculative movements, and in particular, so long as a slight and temporary surplus is capable of causing price movements, similar to those of 1928, the situation will remain full of potential dangers."

World consumption increased ten percent in 1928 over 1927, while the price was steadily falling. On the other hand, the output promises to be 25,000 tons greater in 1929 than in 1927.

Sooner or later the efforts of the producers will be successful as they have been in other fields where strong organizations co-operated for their mutual advantage. And it is only right that they should be. All that consumers ask is stability at a fair price. That this price may be higher than present quotations, many will freely admit. It is to be hoped, however, that producers will recognize the need for stability to consumers along with their own need for better prices.

Defective Bridge Cable

A SHORT time ago construction work on the Detroit International Bridge was stopped. Cables had been used which were identical with those which had developed defects in the Mount Hope Bridge to connect Newport with the Rhode Island mainland.

According to the first newspaper reports, it was said that some of the faults might have been caused by zinc coating which had caused the steel to become brittle. The Bureau of Standards is making an investigation into the causes of these defects, but preliminary engineering opinion makes no mention that the zinc coating had any contributing effect. Cable wire breakages may have been progressive in character resulting from the gradual redistribution of the load among the wires as one after another went out of service. It is noted particularly that in the Mount Hope bridge, for the first time a hardened and tempered spring steel wire, cold bent, was used and that the breaks came at the cold bend.

The builders of these bridges are to be congratulated for their promptness in making these records public. The information gained will be of incalculable value in future construction. It is probable, however, that the troubles were caused by mechanical defects in the basic material rather than the protective coating.

Light's Golden Jubilee

THEY are celebrating at this time "Light's Golden Jubilee," the fiftieth anniversary of Thomas A. Edison's invention of the incandescent lamp. In 1879 Mr. Edison made his first practical flameless light which has revolutionized industry, living conditions, and in many important respects, humanity itself.

It is given to few men to affect the world as Thomas A. Edison has done. It is useless to attempt to list all of his inventions and their effects. In this particular instance, perhaps the most important, after thirteen months of unremitting work, a lamp was produced which consisted of a horse-shoe shaped filament of carbon made by "firing" cotton thread in a special high temperature furnace. It was connected to platinum leading-in wires by metal clamps. Revolutionary as it was, this lamp would be considered impossible today. It was sold for $1.25, giving a light of sixteen candles and burned for only forty hours. Today, we have a concentrated and perfectly coiled drawn tungsten filament connected by special copper leading-in wires, infinitely sturdier, giving much more light and selling for one-fifth of the original cost, even at our present inflated prices.

But the fact is that the present incandescent lamp, inside frosted and of attractive shape, would have been impossible without Edison's pioneer work. All honor to the great man.

Correspondence and Discussion

Nickel Anodes

To the Editor of THE METAL INDUSTRY:

Out of a multitude of papers on the general subject of electroplating, so few appear that give more than a passing thought to the anode performance and devote their entire substance to cathode deposits or to the electrolytes, that it is interesting to read in a recent issue of THE METAL INDUSTRY,* Mr. Hogaboom's contribution, entitled "Nickel Solutions," which is an opportune and illuminating article on the present anode situation.

It is not unnatural, of course, that in papers on electroplating the matter of character of deposit should have preferential consideration inasmuch as that is the end and aim of the work. But while the anode has been in the past considered mainly in the light of a necessary evil and accepted as a matter of course with all its slimes and sludges, or perhaps in spite of them, it is now in this day of fast and superior plating a more important part of the assembly, and hence a prolific source of discussion between anode maker and user. Therefore it is rather surprising that more has not been done or published on this matter of anode corrosion.

To the demand for a better nickel anode, imposed mainly by the larger nickel platers, the manufacturer has supplied the high purity anode which is a very definite improvement over the 90/92 and 95/97 products, and destined eventually to supplant the impure varieties altogether. This statement is made advisedly, as there are still plenty of platers who will immediately disagree with it, and who swear by the 95/97 grade; fortunately, those lingering adherents of the old 92% anode have now, with little exception, graduated to the use of the higher purity of metal.

Many there are who have tried out the pure nickel anode and have failed to get the advertised results, mainly because, as Mr. Hogaboom in his article points out, they have tried to put "new wine in old skins," with the usual results. They have failed to take into consideration the necessity of adjusting their solutions to take care of the increased passivity and different corrosion qualities of the new type anodes. This has led to the inevitable aforementioned discussions between manufacturer and plater, as it is a foregone conclusion that when trouble develops and anodes misbehave, the protest first invariably goes back to the anode producer. Such complaints are to a degree disappearing, however, as the advantages of the use of chlorides and of close chemical control become more widely appreciated, and with this experience has come increasing satisfaction, and really much less trouble than resulted from the employment of the less pure product. There is still, however, too large a proportion, even among platers of some importance, who are content to gauge their work merely by the color and quality of their plate, and are indifferent to or disdain the modern methods of control. These are the ones, of course, who run into difficulty on changing to a different character of anode metal. A typical case occurred recently at the plant of a sizable plater where trouble had developed in the barrel tanks. Several makes of anodes were in use, and all were corroding badly although the trouble was affecting each type differently, some disintegrating almost en masse, others coating themselves with a protective crust of passive nickel. The plater proudly displayed samples of his burnished products as proof of the reliability of his methods, and indeed the pieces were bright and pleasing to the eye and no doubt also to the management of the concern.

The anodes, they pointed out, were obviously bad. Prescribed amounts of single salts, it was ascertained, were being added periodically as well as small amounts of chloride of sodium, but no test of acidity was ever thought of. Actual examination of the liquor showed it to be completely alkaline. No electrical instruments were in evidence and no chemical tests were ever made. The operation was guided by appearance of the plated product, which after all may be a proper standard, but from the standpoint of the anode maker it is manifestly impossible to produce a metal which will stand up to such conditions and unfair of the user to expect it. Many platers are now following the prescribed book formulæ and are making their additions religiously, but too few of them are yet to the point of controlling their p H's, and to this failure especially is due much of the complaint on anode performance and to faulty cathode deposits as well.

For the most part this all does not apply to the large platers of the country who not only maintain adequate supervision over all their plating operations but also have done much in the way of development to help prove and establish the advantages of the high purity anode. It is the smaller platers who must be educated, and it is such an article as the one referred to which will go a long way toward clarifying the situation and demonstrating to the plater that he should not at once condemn his anodes if they display passivity, or disintegrate, or sludge immoderately. Rather should he look to his solutions or to other external conditions which are more than likely to be at fault. The anode is merely reflecting the bad treatment which it is receiving and conversely will, if allowed to operate in a proper medium, return a better grade of work and at efficiencies never possible with the older and less pure types of metal.

All of which does not necessarily mean that we have as yet reached the goal of the perfect anode. When that one is made which will corrode ideally under all the conditions to which the various platers may subject it, then we may rest on our laurels. But that Utopia is not in sight, nor is it likely to appear. Both the producers and users must cooperate to achieve the desired results, the one to produce the best anode possible, the other to adjust his conditions so as to get the best use out of it. Certainly, much has been accomplished since the time when the nickel anode was an alloy with iron, tin, and carbon. Now it approaches in purity the best anodes of copper, silver, or zinc, which places it on its proper plane. The effort to improve its corroding quality will continue, but let the plater do his part also for the good of the art and the satisfaction of all concerned.

Clearfield, Pennsylvania,
April 26, 1929.

GEORGE W. PAWEL,
Metallurgical Engineer,
American Mond Nickel Company.

To The Editor of THE METAL INDUSTRY:

The comments of Mr. Pawel are appreciated especially coming as they do from such a worthy competitor. It is true as Mr. Pawel states that not enough attention has been paid to the performance of an anode in any plating solution. All platers can talk cathode current density and try every means to maintain it at as high a point as possible. How many know anything at all about anode current density and where can anything be found in the literature about this? If good cathode current is essential then the metal concentration of a solution must be maintained fairly constant by the corrosion of the anode. This can only be done when the proper anode current density is used. Along with anode current density, the passivity of the anode must be considered. What is needed in a solution is not only a salt to increase the conductivity but, more important, a salt that will dissolve the products formed on the anode during electrolysis, thereby eliminating all polarization and passivity.

In the near future it will be found through research investigation of nickel solutions that the black coating on high purity nickel anodes, which is a mixture of nickel oxide and nickel peroxide, does not come from the anode but is deposited upon the anode from the solution. This is the result of both the passivity of the anode and the composition of the solution, the latter, of course, materially effecting the passivity.

It is predicted that when the anode current density and the function of the different addition salts used in nickel plating is better understood, pitted and rough deposits will be eliminated without the addition of a chemical that has but a temporary beneficial effect.

GEORGE B. HOGABOOM.
Matawan, N. J., June 3, 1929.
Electroplating Engineer, Hanson-Van Winkle Munning Company.

*Vol. 27, No. 4, Apr., 1929, Pages 172-5.

Cadmium Mercury Deposit

To the Editor of THE METAL INDUSTRY:

May we draw to your attention an answer by Oliver J. Sizelove to problem 3816 in your February issue, page 91, in which he gives a formula for Cadmium Plating, stating at the foot—

"Use two grams mercury cyanide per gallon of solution as a brightener."

We enclose for your information two copies of our booklet "Rust-Protection" of which kindly pass one along to Mr. Sizelove, drawing his attention to the list of our patents on page 15, covering cadmium mercury and cadmium zinc mercury depositions.

Please request him to supplement his reply to the problem in question by stating that the use of mercury in cadmium solution comes under the head of our patent and that, therefore, any material used in such solution, including anodes, should be purchased from us.

In future, whenever he desires to advocate the use of mercury, in zinc or cadmium plating solutions, the fact should be mentioned that such use is protected by our patent.

April 2, 1929 The Roessler & Hasslacher Chemical Co.
New York, J. E. WEBER.

To the Editor of THE METAL INDUSTRY:

In reference to lettter from J. E. Weber to answer No. 3816, page 91, February issue of THE METAL INDUSTRY, will say that this answer does not refer to the use of mercury cyanide. However, he has probably referred to question 3813 of the same issue.

In the booklet that was sent along with letter, can find no reference to the use of mercury cyanide as a brightener, but if one of the patents referred to covers the use of same, kindly supplement the following to question No. 3813 in your next issue:

"The use of mercury cyanide as a brightener for cadmium solution is controlled by patent and it will be necessary to obtain the consent of the Roessler & Hasslacher Chemical Company to use same."

Irvington, N. J. —OLIVER J. SIZELOVE.
April 8, 1929

Appreciates Classification

TO THE EDITOR OF THE METAL INDUSTRY:

I am glad to see you do not split articles and that you do not mix ads and reading matter making a person go over the whole book twice if he wants to see everything in it. The ads as a source of information are at least of equal importance to the reading matter. A person goes through the ads for information useful to him in his business. They should be grouped together so that information will be found where it is looked for. If I were looking for a machine I would appreciate having the ads of the different makers of that type of machine grouped together so I could compare them and see which one best fitted my need, and not be compelled to pick them out from among ads of other things in which I was not interested, and reading matter, which at that time would only be a distraction.

New York, JOSEPH F. EASTMOND.
April 17, 1929.

New Books

A. S. T. M. Tentative Standards for 1928. Published by the American Society for Testing Materials, Philadelphia, Pa. Size 6 x 9, 932 pages. Price, in paper binding, $7.00; in cloth binding, $8.00.

This annual publication contains 185 tentative standards of which 17 relate to non-ferrous metals, covering copper, bronze (80-10-10), brass ingot, aluminum alloys, aluminum sheet, silver solders, bronze trolley wire, insulated wire and cable, copper tubing, seamless copper tubes, rolled zinc, screen cloth, and methods of analyses of various metals.

Methods in Non-Ferrous Metallurgical Analysis. By Robert Keffer, Chas. L. McNeil and Allison Butts.

The authors of this book speak with unquestioned authority, being, respectively, the late chief chemist of the Anaconda Copper Mining Company, assistant research chemist of the same company and the assistant professor of metallurgy in Lehigh University. The work is presumably based on the practice of the Anaconda laboratories and covers the following subjects: laboratory apparatus, aluminum, antimony, arsenic, barium, strontium, bismuth, cadmium, calcium, carbon, chlorine, chromium, cobalt, copper, fluorine, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, nitrogen, phosphorus, potassium, sodium, selenium, tellurium, silicon, sulphur, tin, titanium, uranium, vanadium, acids, alkalies, xanthates.

Impurities in Metals. By C. J. Smithells. Published by John Wiley and Sons, New York. Size 6 x 9½, 157 pages. Price, $5.00.

We have here a comprehensive description of the influence of impurities on the structure and properties of metals. It is written with an eye particularly to the effect of the small amounts of outside substance which are always present in commercial materials. The recent preparation of a few metals in spectroscopically pure state has made it possible to make interesting comparisons, and while the work is at this time perhaps, theoretical in character, it is likely to exert considerable influence on practical metallurgy. The book is unusually well written and reads easily in a most interesting manner. It would be a good thing for everyone engaged in the manufacture of metals to read it, whether he is a metallurgist or works operating man.

Specific subjects covered are as follows: Methods of Studying the Structure of Metals; X-Rays and the Structure of Metals; the Structure of Pure Metals; the Structure of Alloys; the Influence of Minor Constituents on Structure; Influence of Minor Constituents on Mechanical Properties; the Influence of Minor Constituents on Corrosion.

Practical Automotive Lacquering. By William J. Miskella. Published by Finishing Research Laboratories, Inc., Chicago. Size 6 x 9, 190 pages. Price, $3.50.

A handbook of lacquering methods as applied to metal work in general and automotive parts in particular, such as motor trucks, buses, automobiles and airplanes is something new in technical literature. The book is written from a decidedly practical aspect, by one who has had long experience in finishing methods.

Individual subjects covered are as follows: Related Processes, (such as vitreous enameling, chromium plating, etc.); Shop Cleaning Equipment; Spraying Equipment; Accessory Equipment; Masking Tape and Reveals; Sandpapers and Waterproof Coated Abrasives; Cleaning the Metal Surface; Primers, Putties and Surfacers; Lacquers; Hazards and Precautions; Striping, Stencils and Decalcomania Transferring; Motor Trucks; Buses; Airplanes; Finishing Systems; Car-Washing.

Trade Associations. By Benjamin S. Kirsch. Published by Central Book Company, New York. Size 6 x 9, 271 pages. Price $5.00.

This is a comprehensive analysis and discussion of the legal aspects of trade association activities, dealing with the construction and positive features of trade association activity as well as the negative and prohibited practices. It is a practical as well as analytical survey of trade associations and the law.

The book covers the following general divisions of its subject in the individual chapters: Trade Association Law; Trade Association Statistics; Uniform Cost Accounting Methods; Credit Bureau Functions; Patent Interchange; Foreign Trade Functions, (covering their relations with government agencies, modifications of the anti-trust laws, international cartels, the tariff, etc.); Collective Purchasing; Standardization; Trade Relations; Restricting Channels of Distribution.

Shop Problems

This Department Will Answer Questions Relating to Shop Practice.

Associate Editors { H. M. ST. JOHN, Metallurgical; W. J. PETTIS, Rolling Mill; W. J. REARDON, Foundry; P. W. BLAIR, Mechanical; C. H. PROCTOR, Plating-Chemical; O. J. SIZELOVE, Testing-Analytical

Bronze for Enameling

Q.—I would like a formula for bronze for enamel work. At present I am using a mixture of copper 90% and zinc 10%, which is not satisfactory. I have also tried copper but find this too soft. Could you let me have a formula for bronze which gives better results with transparent enamel?

A.—We suggest a mixture of 80 copper, 14 zinc, 6 lead. We believe this will meet your requirements.

If you require a harder alloy we suggest 82% copper, 6% lead, 2% tin, and 10% zinc. —W. J. R., Problem 3,853.

Casting Copper

Q.—Please answer through the next issue of THE METAL INDUSTRY, how high a percentage of copper can be made into castings successfully and have good, solid castings? How is it done? What precautions must be taken?

A.—1. Copper castings can be made and are made every day containing 99.50 to 99.75% copper. They must be solid or are rejected.

2. How is it done? By proper melting, proper gating and risers.

3. The precautions that should be taken, are to use good electrolytic ingot copper and melt as quickly as possible; keep metal covered. Get metal up to 2,200° and add 3 to 5 ounces of 10% silicon-copper with a handful of common salt just before pulling pot out of furnace.

Now to check up your melting practice, make a test of the metal before pouring by ramming up a blank mold and inserting a 2½ sprue cutter, 4" deep in the sand, and pouring the copper in this sprue. If the metal has been properly melted and deoxidized the metal will go down in the sprue. If not, it will come up and should not be poured as defective castings will be the result of pouring this metal.

It may be well, however, to add 3 ounces more of 10% silicon-copper and to pour another test of the metal. If the metal goes down now it is safe to pour. The whole secret is proper melting of the metal.

For molding, chills or risers are necessary to take up the shrinkage and to assure a good casting. There is no set rule for gating every job. Each job must be gated and risered to suit the conditions of the pattern. —W. J. R., Problem 3,854.

Excess Metal in Copper Solution

Q.—I am sending you a sample of a copper cyanide solution that I have used for plating steel and wrought iron as well as ingot iron. The temperature of this solution when properly working at this plant is 110 to 130° F. The anode surface is kept large and the distance between the anodes is 8 inches. The tank is 10 ft. long, 5 ft. deep and 12 in. wide. We use about 2 amperes per square foot of work surface. The tank is steel. For large work, like elevator doors, etc., blistering occurs when current is too high. Also, we cannot make metal adhere without striking in nickel solution or bronze cyanide solution first.

We would like to know if the metallic content, the cyanide content or the temperature should be higher. Most of the iron parts plated in the copper cyanide solution are for color finishes such as statuary bronze, Bower-Barff, etc. We produce three shades of statuary bronze, light, medium and dark. We use liver of sulphur for fast coloring and brush out with pumice.

We would like to hear from you about the solution if you care to analyze it.

A.—The copper solution analyzes as follows:

Metallic copper	6.64 ozs.
Free cyanide	08 oz.

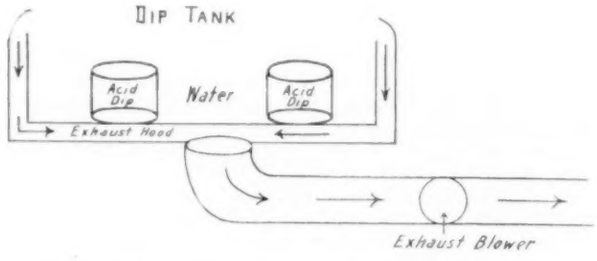
The solution is too high in metal and low in cyanide. We would advise you to reduce the solution one-half, replenish with water and add 1 oz. sodium cyanide per gallon.

The plating temperature should be 120° F., use 5 amperes per square foot of cathode surface. If after these corrections have been made the deposit still blisters, look to your cleaning methods.

—O. J. S., Problem 3,855.

Fume Exhaust System for Acid Dips

Q.—I would like your opinion as to the best fume exhaust system for acid dipping tanks. I intend to move to new quarters shortly and will need to know the best method. I would like to know whether the open-blade fan inserted in a window is best, or whether it is better to have a pipe and hood system. There are only two front windows in the new place I am taking and



Cross Section Side View of Fume Exhaust System for Acid Dips

I intend to put the dip at the rear, where there are no windows for the open-blade fans.

A.—The old method of exhausting the fumes from an acid dipping unit by the open-blade window fan is obsolete and should not be used.

The overhead exhaust hood system is in general use, but lately the surface type of exhaust system has come into use. The surface type system is to be preferred as by this method the operator is at no time in direct contact with the fumes, as is sometimes the case with the overhead type.

The surface type of exhaust system consists of surrounding the dip tank with an enclosure and taking away the fumes through a suction type fan from the bottom of the tank.

The side view of the system as shown in the illustration will probably give you an idea of the construction.

—O. J. S., Problem 3,856.

Fluxing Metal

Q.—What is a good flux to remove dirt or oxides from metal.

A.—If you are melting in a crucible furnace we advise you to keep your metal covered while melting and use a small handful of common salt just before pulling the crucible from the furnace.

If in open flame furnace we suggest a shovelful of ground coke dust be added to the metal together with a handful of common salt and half a shovel of Fullers Earth.

There are a lot of fluxes on the market that are used with more or less success, but we have found the above will clean the metal and remove oxides if the metal has been melted quickly and not soaked in the furnace. More metal is spoiled by slow melting and holding than in any other way. The castings are dirty and very often spongy. —W. J. R., Problem 3,857.

Nickel Plating Installation

Q.—We expect to go into the nickel plating business and want to make our own steel tanks. Please advise if we could line them with an asphaltum paint. If not, what would you suggest? Would the nickel tank and the rinsing tanks have to be lined with lead, so that they would not rust?

What do you mean by electro-cleaning, or steaming? Will you please give us a good nickel solution.

A.—You could line the steel tanks with an asphaltum pitch composition which can be purchased from any dealer in plating supplies, but the best method to use would be to line them with hard rubber. This material is to be recommended, especially when hot solutions are to be used. If iron tanks are to be used as rinse water tanks, we would advise lining them with hard rubber also.

The process by which grease is removed from the work by the aid of the electric current before being plated is termed electro-cleaning. Either the direct or reverse current is used and sometimes both.

Formula for nickel solution:

Double nickel salts	8 ozs..
Single nickel salts	4 ozs.
Boric acid	2 ozs.
Sodium chloride	2 ozs.
Water	1 gal.

—O. J. S., Problem 3,858.

Soft Metal Alloy

Q.—We use an alloy consisting of equal parts of tin and lead with a small quantity of antimony. Castings of this are made and it is impossible to eliminate blow holes resulting from shrinkage when the metal cools.

It has been suggested that a metal might be used which does not shrink on cooling. Bismuth and copper have been mentioned for this purpose. Can you give us information or advice in what books we may be able to learn regarding what metals or alloys may be used that will not shrink on cooling?

Since the castings which we make are to be cut with chisels, a non-shrinking alloy should be fairly soft. You will note that the alloy mentioned in the first paragraph of this letter, consisting mainly of tin and lead, is quite soft. We could cut an alloy somewhat harder than this.

A.—We suggest you try the following mixture:

12 lbs. lead
9 tin
1½ antimony

Pour so the metal will just char a pine stick.

Do not overheat in melting. Melt the antimony and tin, then add the lead, and flux with a small handful of rosin. Before adding the flux boil the metal with a piece of green wood. Then add the flux and skim and pour at the temperature stated above.

Another good mixture is composed of:

10 lbs. lead
6 tin
2 antimony

—W. J. R., Problem 3,859.

"Sun Ray Finish" on Aluminum

Q.—Can you tell us how manufacturers of cast aluminum cooking utensils accomplish the finish on the inside of the utensils? It is our belief that this is known as the "Sun Ray Finish." What we are trying to find out is just what equipment and supplies are necessary to duplicate this on cast aluminum.

A.—While we have no definite information covering what you term the "Sun Ray Finish" used on the inside of cast aluminum pots, we believe that the process is as follows:

When the article is skin turned in a regular turning lathe where it is held in position by a chuck during the turning operation to produce a smooth surface, the finish is applied before the article is removed. An abrasive is used such as 100-mesh carborundum steel wool, emery cloth or glass sand paper. On brass, years ago, the finish was produced with 60-mesh emery, a heavy oil and cotton waste. The oil afterwards was removed by cloths moistened with benzine.

These suggestions may aid you in producing the finish you desire to know about.

—C. H. P., Problem 3,860.

White Gold Stripping and Plating

Q.—I would like to have a formula for a bright white gold stripping solution and directions as to voltage, etc. The solution I am using now strips nicely and the work comes out white but not bright, and I must have a solution that will make the work bright as well as white. I want to use it on white gold filigree rings.

I would also like a good formula for a white gold plating solution.

A.—We can refer you to the following: see page 382, THE METAL INDUSTRY, 1926, (September), "Pickling White Gold," by Charles H. Proctor. This gives data on pickling and electro-stripping of white gold. On page 265 of Brass World for 1928 (August) you will find "Removing Scale from White Gold," by Oliver J. Sizelove, which gives similar information. These two references should adequately cover your needs.

The most satisfactory white gold electroplating is done by means of the porous bell method, which is as follows:

Determine how many gallons of white gold solution you desire to prepare, then arrange for the operation of the solution under the same conditions as for yellow or green gold. The solution is as follows:

Water	1 gal.
Sodium cyanide	3 ozs.
Bisulphite of soda	½ oz.
Anodes, 18 karat white gold.	

Arrange the solution as mentioned and weigh the white gold anodes before putting in the solution.

Secure the porous cells of two old dry batteries. Wash them thoroughly and drill two holes in each, near the top and opposite each other. In the holes fasten two pieces of iron or steel wire, forming them into hooks so that the cells can be immersed in the solution by hanging them on the work (cathode) rod. **Do not let the solution come in contact with the iron or steel hooks.**

Dissolve 4 ozs. of sodium cyanide in a pint of warm water and pour it into the two porous cells. Get a piece of thin sheet steel shaped like a tube about 1¼ or 1½ inches in diameter and drill holes in the top; fasten some heavy copper wire in the holes so the tube will hang on the work rod.

When all is arranged as outlined, start the current going at 4 to 6 volts. A violent action will take place inside the porous cells. This indicates the gold in the anodes is starting to reduce. Keep up this anode reduction until you have dissolved sufficient white gold in the solution to approximate ½ oz. per gallon of solution. It is possible that you can get good results with less gold in the solution and you can decide this by test. White gold solutions should not be operated at temperatures over 80° F.

A definite formula for a white gold solution is as follows:

Yellow Gold Solution

Water	1 gal.
Sodium cyanide, 96-98%	2 ozs.
Sodium gold cyanide	½ oz.
Caustic potash	½ oz.
Silver cyanide	⅛ oz.
Nickel cyanide	⅛ oz.
Anodes, 18 karat white gold.	
Temperature, 80° F.	
Voltage, 4 to 5, usually, or as desired to produce required deposit.	

To prepare the solution, dissolve the sodium, the silver and the nickel cyanides in one pint of water at 140° F. Then add one pint more of water, then the caustic potash. The solution is ready for operation after adding one quart of cold water. We have given the minimum amount of sodium cyanide. Possibly more can be used to advantage. Sometimes a very minute amount of copper will help to produce a more distinct white gold. You might try adding 1/64 to 1/32 oz. of copper cyanide per gallon.

—C. H. P., Problem 3,861.

Patents

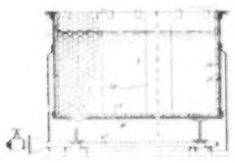
A Review of Current Patents of Interest

Printed copies of patents can be obtained for 10 cents each from the Commissioner of Patents, Washington, D. C.

1,707,770. April 2, 1929. **Apparatus for Removing Surplus Spelter from Galvanized Articles.** Wayne Rawley and Orand A. Pluskey, Pittsburgh, Pa., assignors to Blaw-Knox Company, Pittsburgh, Pa.

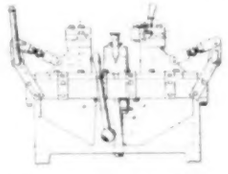
Means for removing surplus spelter from galvinized shapes, comprising a supporting rest over which a plurality of coated shapes are adapted to be withdrawn from the spelter bath, means for withdrawing the shapes and groups of nozzles associated with the supporting rest for blowing streams of air against the upper and lower surfaces of the individual shapes as they are withdrawn.

1,709,022. April 16,1929. **Tank for Chromium-Plating Baths.** Leo D. Jensen, Chicago, Ill., assignor, by mesne assignments, to United Chromium, Incorporated, New York.



A tank for chromium plating baths, of metal, with glass sheets covering the inside metal faces, adapted to cut off stray currents, and to prevent short-circuits between the electrodes and the inside of the metal tank, and means for holding said sheets in place, said means holding the upper edges of said glass sheets.

1,709,249. April 16, 1929. **Apparatus for Making Castings.** James J. Dimeo, Cleveland, Ohio assignor to The Permold Company, Cleveland, Ohio.



In a permanent mold adapted for casting substantially cup-shaped articles from aluminum alloys and the like, in combination, a support, a plurality of separable mold sections, means for guiding said mold sections into and out of molding position on said support, said mold sections having complemental recesses in their inner faces forming a substantially cup-shaped casting cavity opening downwardly, a permanent core arranged to be moved upwardly into molding position within said casting cavity and to be withdrawn downwardly therefrom, and an auxiliary core member carried by one of said mold sections and movable downwardly into cooperative engagement with said core whereby an axial aperture may be formed in the casting.

1,709,268. April 16, 1929. **Electrodeposition of Metals.** Thomas William Stainer Hutchins, Davenham, near Northwich, England.

A process for the electrolytic formation of metals in tubular formation which comprises electrolytically depositing metals on a tubular polished tapered cathode made of an alloy containing a major proportion of iron and a minor proportion of chromium heating the cathode and deposited metal, then quickly chilling the metal and cathode whereby separation of the formed tube and cathode occurs.

1,709,523. April 16, 1929. **Anode.** Frank J. Delavie and Howard H. Blouch, Cleveland, Ohio, assignors, by mesne assignments, to The Grasselli Chemical Company, Cleveland, Ohio.

An anode for use in electroplating, comprising a core of inert conductive material which is formed into a hook at one end and an eyelet at the other end, said core having a body of anodic metal cast around it between the hook and eyelet.

1,709,542. April 16, 1929. **Solder Flux.** John D. Raymond, Detroit, Mich.

A solder flux of the class described, consisting of muriatic acid 3 parts, oleic acid two parts, powdered rosin two parts, sodium chloride one part.

1,709,801. April 16, 1929. **Manufacture of Thin Metallic Foils.** Carl Muller, Charlottenburg, near Berlin, Germany, assignor to Karl Mey, Berlin, Germany.

A method of manufacturing thin foils of appreciable extent consisting in producing by superposition a compound sheet of three layers wherein a coherent foil forming layer produced by deposition and of desired thinness is sandwiched between two further layers and removing the said two outer layers from the intermediate foil forming layer by molecular decomposition, the said protective outer layers being of sufficient thinness to avoid detrimental stress being exerted on the foil layer on removal of the protective layers.

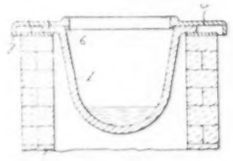
1,709,894. April 23, 1929. **Surface Treatment of Light Metals.** Edward C. Burdick, Midland, Mich., assignor to The Dow Chemical Company, Midland, Mich.

A process of the character described, which comprises treating a magnesium containing surface with a di-hydrogen phosphate.

1,710,148. April 23, 1929. **Aluminum-Base Alloy.** Samuel Daniels, Dayton, Ohio.

An aluminum base alloy containing copper between 2.25 per cent and 3 per cent; iron, .75 per cent to 1.5 per cent and containing a few tenths of a per cent each of magnesium and silicon, the ratio of the magnesium to the silicon being about 1.7 to 1.

1,710,234. April 23, 1929. **Furnace.** Adolph L. Nelson, Detroit, Mich., assignor to Bohn Aluminum & Brass Corporation, Detroit, Mich.



In a holding furnace, the combination with an annular wall, of a pot having an annular flange at its upper edge resting upon said wall and forming a joint therewith, and a ring supported upon said annular flange and extending outwardly there beyond for deflecting foreign material which might pass outwardly through said joint away from said pot.

1,710,398. April 23, 1929. **Method of Purifying Light Metals.** Herman E. Bakken, Niagara Falls, N. Y., assignor to American Magnesium Corporation, Niagara Falls, N. Y.

The method of removing entrained impurities from a readily oxidizable light metal, comprising passing the metal in a liquid state through a porous mass of metal substantially insoluble in the molten metal, the impurities being retained by the porous mass.

1,710,743. April 30, 1929. **Surface Treating Aluminum Articles.** Aladar Pacz, East Cleveland, Ohio.

A dipping solution for producing a colored coating on articles composed at least in part of aluminum which contains a soluble fluorine compound and a salt of one of the metals, silver, nickel, tin, cobalt, zinc, cadmium, iron, manganese, lead, antimony, copper.

1,710,747. April 30, 1927. **Method of and Apparatus for Coating Metal.** Franklin Smith, Brooklyn, N. Y., assignor to American Machine & Foundry Company, a Corporation of New Jersey.

The method of metallically coating metal, which consists in thermally vaporizing the coating metal, then ionizing the metallic vapor, and electrically depositing and condensing the ionized vapor on the metal to be coated.

1,711,389. April 30, 1929. **Centrifugal Machine for Treating Metal Articles Coated by Immersion.** Hans Hofer, Zug, Switzerland, assignor to Verzinkerei Zug A. G., Zug, Switzerland.

1,711,807. May 7, 1929. **Process of Finishing Metal Articles.** Laurence Rutherford Preston, Devonport, England.

As an article of manufacture, a solder comprising tin, zinc, aluminum, bismuth and coated with stearic acid, silver sand and phosphor tin.

Equipment

New and Useful Devices, Machinery and Supplies of Interest

Dust, Fumes and Health

By M. A. EIBEN
President, Northern Blower Company, Cleveland, O.

The manager of the average plating and polishing plant has little chance of overlooking the necessity of dust and fume removal. The State sanitary laws and the factory inspectors see to that. But there is another aspect to this matter which is occasionally left without the consideration which it deserves.

A dust and fume removal system is not merely something which must be installed unless trouble is expected from the inspector. It can easily be made an important contribution to profits. The health of employees is of the utmost importance, not only from the natural humanitarian view but also because absences due to sickness, increased labor turnover and workmen's compensation are a serious item in lowering production and profits. Fresh clean air is the first necessity of health, and attention to this will be well repaid even if the resulting installation does cost a little more than the factory inspector would allow the manager to "get away with."

In general ventilation of large areas in which the work is not dusty, it will usually be sufficient to use propeller fans at suitable points. The layout however should be carefully considered. Drafts should be avoided, and for this reason it is usually preferable to have several medium sized fans rather than a smaller number of larger ones. There is such a thing as too much fresh air especially if it blows down the necks of some of the workmen. For departments where the air is dusty or full of fumes, however, a more positive method of removal must be adopted, and an air-duct system is used.

The choice of a dust or fume collector depends upon the amount of recovery percentage desired; on whether the recovered material has any particular value; whether the dust-producing operations are continuous; whether there is any risk of nuisance complaints from the neighbors; the amount of danger in the nature of the material to be collected; and lastly—and this is intentionally placed last—the initial and operating cost of the installation necessary to do the job. This is not the usual order of consideration, of course—but unless the system does what it is intended to do, it is a failure, whether it costs the ultimate user much or little.

With these points in view, we will briefly analyze the efficiency and construction of the various types of dust and fume arresters available.

The cyclone type collector is useful mainly for recovering large, hot or highly abrasive dust. It operates on the centrifugal principle. The air, entering the upper part of the collector at an angle, is compelled by the central annular baffle plate to assume a rotary motion. In consequence of the greatly increased cross sectional area of the collector compared with the inlet pipe, the high speed of the air which was necessary to carry the dust through the ducts is slowed down, and the suspended material slowly spirals downwards into the conical hopper below. The air passes out through the open top to the outside of the building. This method would afford a perfect means of recovery were it not for the differing sizes of the suspended grains of dust. As a matter of fact, about 87% is about as much as can be reasonably expected from a collector of this type—amply sufficient where complete recovery is not necessary, but not desirable where the material has value or where a dust nuisance can be created in the vicinity.

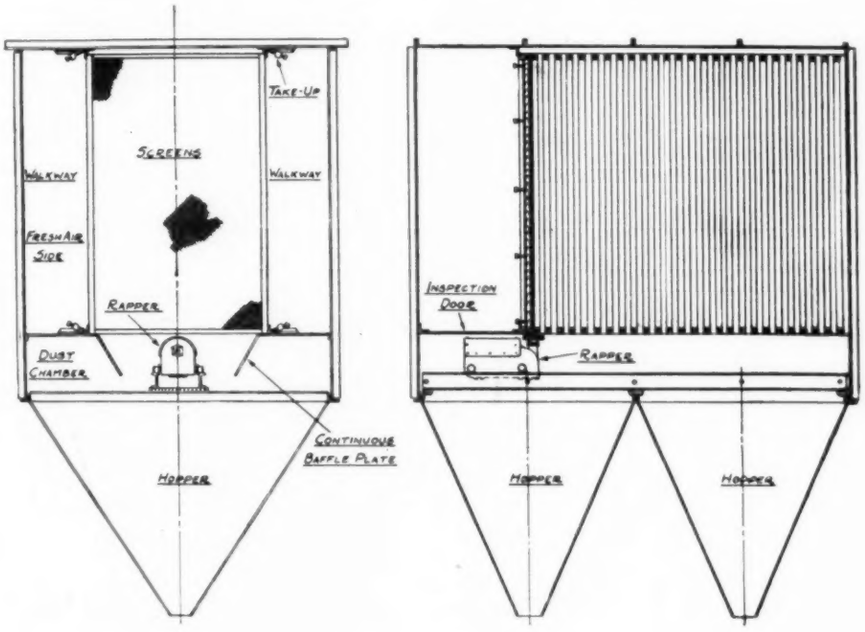


Fig. 1—Sectional Diagram of Norblo Cloth Screen Arrester, Showing Rapping Carriage and Screen Gang Assembly.

For high efficiency in dust recovery, it is necessary to use some positive method of filtering and arresting the dust. In the Norblo cloth screen arrester, which type has an efficiency of over 99% recovery, the filtering screens are contained in a sheet steel case. The dusty air enters at the lower part of the case, and is slowed down by being directed against a baffle plate which extends completely along the inside of the case, thus forming on its upper side a convenient walkway for use when inspecting or changing the screens, etc.

The checking of the air-speed releases the heavier dust at once, and this falls down into the hopper below. The lighter dust, which in the case of the cyclone collector would pass out into the surrounding atmosphere, passes slowly upward to the gang of closely assembled cloth screens which do the filtering. The dust remains on the cloth surface; and the air,

now clean and fit to be returned to the shop if desired, passes out of the case to the outlet.

In order to maintain proper filtering capacity, it is necessary to shut down the arrester every few hours to shake off from the screens the accumulation of dust which has collected upon them. There are various ways of doing this—by compressed air or cam-operated rapping hammers placed at intervals along the sides of the screen gang, or by a traveling electrically-driven rapper carriage. The latter is generally preferable because is assures each

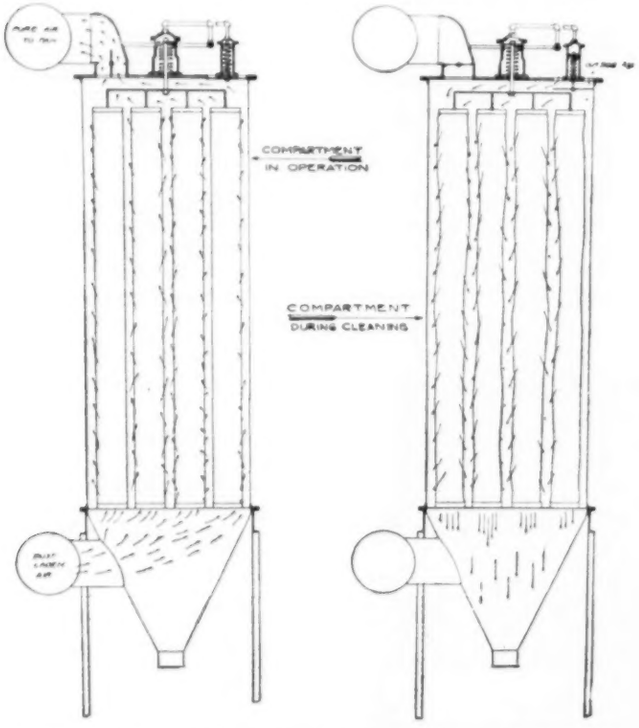


Fig. 2—Sectional Diagram of Norblo Continuous Suction Air-Filter, Showing the Direction of the Air Currents for Filtering and for Cleaning Respectively.

individual screen receiving an equal amount of vibration, and because it involves no complication of long rapping hammer drive-shafts where the length of the arrester case is considerable. This traveling rapper carriage is so arranged that on pressing a button the carriage advances slowly from end to end of the under side of the screen gang, automatically reverses, returns to the starting point and shuts off the current.

There is unfortunately at the present time no established standard of screen area for a given filtering capacity. The larger the screen area, however, the slower the air can be drawn through the fabric, and therefore the better is the filtering action. Another angle to this is that the slower the air travels the greater the length of the life of the screens. It is perfectly possible to have two arresters which will filter an equal amount of air although one may be less than two-thirds the size of the other. The life and efficiency of the smaller one will, however, be almost certainly decidedly less than that of the other. It will also require more frequent rapping of the screens. The dust will be driven into the fabric instead of merely resting upon its surface, and will be harder to dislodge. Furthermore, if the screen area is less the air velocity must be greater for a given volume, and if excessively high there is a risk of static electricity being formed through the friction of the dust and the cloth—a danger which should be carefully avoided.

As a general rule, the cloth screen type arrester described above is adequate to meet all requirements. In a few cases, however, the dust-producing operations are continuous—that is, on a 24-hour scale. The necessity of stopping for a few minutes every four or five hours in order to rap the screens may therefore be undesirable, as even this brief pause in the dust arresting may permit the air to become charged with floating matter. In such circumstances it is advisable to use a continuous action air-filter. This type of dust removal equipment is more expensive per given air purifying capacity, but it is so constructed that it need never be stopped.

The construction of a Norblo air-filter of this type is of course decidedly different from the screen arrester already described. The filter is split up into three or more separate steel case units, each separately controlled by a master valve operated by an electric motor or other convenient means. The cloth through which the air is filtered is not stretched on screen frames but is in the form of bags or "stockings" suspended inside the case units in groups. The sequence of operations is as follows: Nos. 1 and 2 units are filtering the incoming air. The dusty air enters the units at the bottom; passes upwards through the cloth fabric; and enters the clean air chamber on top. Thence it is distributed to the required points in the plant. In the meantime, No. 3 is temporarily out of action, the current in it being reversed so as to blow off from the surface of the bags the accumulated dust. After a short interval, the electrically driven master-valve operates to change the air connections of the units. No. 1 is now cut out of action for cleaning instead of No. 3, and Nos. 2 and 3 are on filtering. After another short interval, the master valve again changes the relative air connections, and No. 2 is cut out while Nos. 1 and 3 are filtering. It is thus possible to effect the necessary cleaning without interrupting the operation of the system, and in fact, any unit can be cut out of action entirely for any length of time necessary to make adjustments or inspections.

The disposition of fumes from plating and pickling tanks is a somewhat different problem. Cloth screens or bags cannot generally be used, because of the moisture and of the usually corrosive nature of the chemicals involved. In many cases, too, the vapor has a very definite recovery value. Pickling tanks of caustic soda for cleaning give off large quantities of irritating steam which is charged with the volatile elements of the solutions used. Both caustic and sulphuric acid will attack steel, and the hoods and ducts are often covered with a lead coating to resist this. The fan must also be protected. It is customary to provide a drain pipe in the fan case to collect

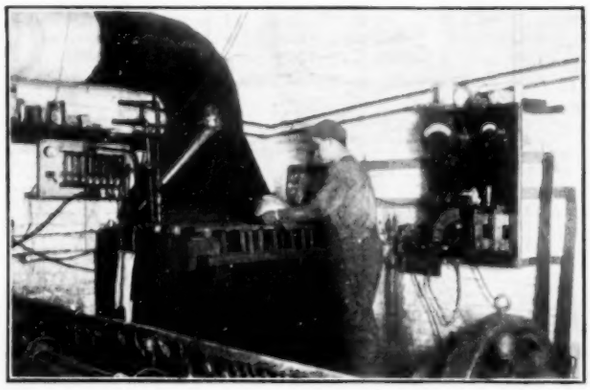


Fig. 3—Special Norblo Fume Exhaust System for Use with Continuous Pickling and Plating Outfit.

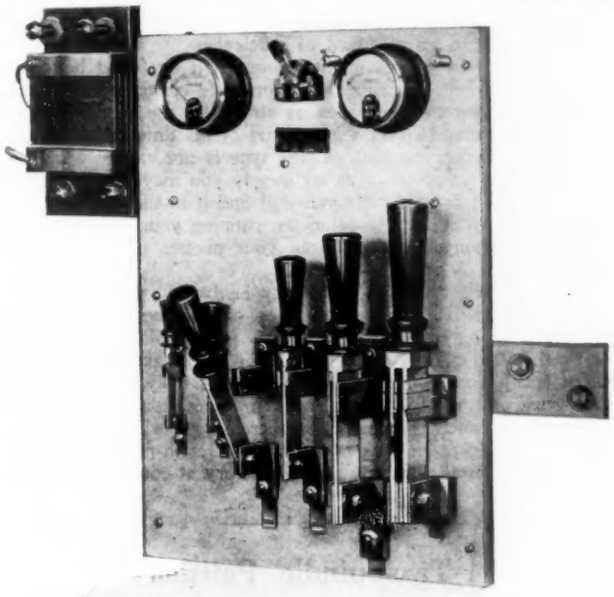
and return to the tanks all condensed solution which may be trapped there. It is not always necessary to lead-coat or otherwise protect the cyclone collector, though a neutralizing spray on the inside of the collector will add greatly to the life of the steel at this point of the system; and will at the same time help to prevent the corrosive spray from escaping into the surrounding neighborhood and creating an actionable nuisance.

Magnesium Statistics

Sales of magnesium produced in the United States in 1928 amounted to 865,662 pounds, valued at $779,674, as compared with sales of 366,400 pounds, valued at $441,700, in 1927, according to the United States Bureau of Mines, Department of Commerce. Eighty-four per cent of the magnesium sold in 1928 was in ingot form. Sales of castings in 1928 were 55,860 pounds, an increase of about 75 per cent as compared with 1927. Sales of wire increased 61 per cent, but those of tubing decreased nearly 40 per cent as compared with 1927. The average price of domestic ingot metal in 1928 was 66 cents a pound, that of powder $1.51 a pound, and of castings $2.39 a pound.

New Plating and Polishing Equipment

Charles F. L'Hommedieu & Sons Company, 4521 Ogden Avenue, Chicago, Ill., have placed on the market two new types of plating and finishing room equipment, consisting of a new lathe and a new tank rheostat. The new lathe called the Reliance is built to give any speed from 1200 to 3600 R. P. M. with alternating



Reliance Rheostat

current. It is belt driven from the motor and the speed changed simply by changing the size of the motor pulley. A hinged hood furnishes full protection against the belt and pulley, at the same time leaving them easily accessible. The belt is tightened by vertical adjustment of the motor.

The motor frame is set back allowing complete freedom to the operator and ample clearance for any size of work. The motor is completely enclosed to insure continuous operation. It is air cooled.

Both motor and lathe are ball bearing. The equipment is

Reliance Polishing Lathe

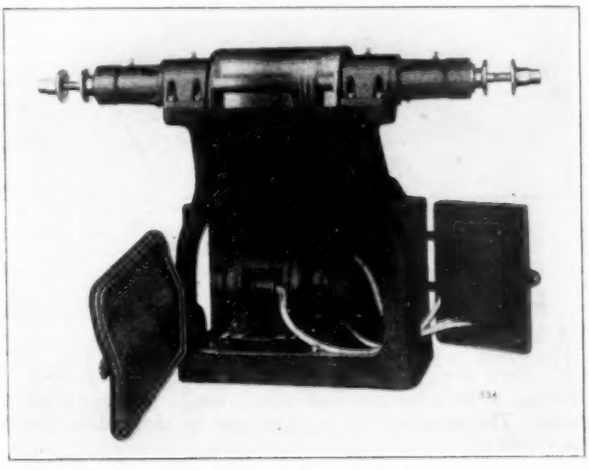
furnished complete with starting switch with push button control.

The Reliance tank rheostat is designed for accurate regulation of plating solutions of all kinds including chromium. It is of substantial construction with coils in the back and the minimum number of switches for close regulation. A double throw switch enables the operator to obtain both generator and tank voltage. It is made in two types and a variety of sizes with capacity for 1000 amperes.

Special Polishing Machine

The Hisey-Wolf Machine Company, Cincinnati, Ohio, is placing on the market a new buffing and polishing machine called the Texdrive. The following special features are noted for this machine.

Safety wheel nut made of Tobin bronze.



Texdrive Polishing and Buffing Machine

Flat-top threads giving security in holding buffing wheel in place.

Special oiling system with gauges and arrangement for quick flushing of the bearings.

Large one piece spindle of nickel steel.

Large ball bearings or Timken roller bearings.

Labyrinth seal to protect bearings from dust and dirt.

Bearing boxes keyed into the column resulting in rigidity of spindle and accuracy of alignment.

Horizontally mounted motor with four point bearings; easy adjustment for motor.

Texrope drive.

A Cleaner for Steel and Iron

Apothecaries Hall Company of Waterbury, Connecticut has added Ahcoloid No. 11 to its list of metal cleaners. An emulsifying agent which is completely soluble is one of its chief ingredients. This gives the cleaner colloidal properties without the sometimes objectional insoluble residue. It is said to be used most effectively for cleaning heavy oils and greases including the usual run of graphitic impurities from cast and malleable iron and hot or cold rolled steel. It is primarily used for cleaning prior to plating but is being used successfully and economically for cleaning before lacquering, enameling and assembling.

Chromium Polishing Compound

Zucker Sons Company, 627 First Avenue, E., Roselle, N. J., have placed on the market a new gray, molded polishing compound for polishing chromium plate. This material is called Krombrik. It is recommended especially for large parts where it is said to work very fast without destroying even a thin plate, and at the same time producing a black mirror finish.

Samples will be submitted on request.

Low Pressure Sand Blasting

By R. E. SIBLEY
Leiman Brothers, New York

There appears to be a great deal of misunderstanding as to what sand blasting is and what it is meant to accomplish, even amongst those who might be expected to know all about it. First of all, there are two kinds of sand blasting. One which uses high pressure air (from five pounds per square inch up to and even exceeding 100 lbs. pressure). The other kind uses air at less than five pounds pressure. The high pressure sand blast accomplishes its work by the brute force of the impact of the abrasive propelled by the high pressure of the air. The other does its work not so much by the great cutting force of the abrasive as by the repeated impact of the sand under the force of the low pressure air.

Each has its own definite field. One does its own peculiar work to better advantage than the other, so it is important to know something about the matter in order to decide whether or not you can profit by its use and if so whether you ought to use high or low pressure.

If too high a pressure is used on sheet metal articles, they will curl up or buckle. For this reason the low pressure sand blasting is best.

Most die castings can be improved in appearance by the use of low pressure sand blasting. This process accentuates the natural color of castings and where they are to be electroplated, painted, enameled or otherwise finished the sand blast produces a mat finish or surface to which the plate, paint or enamel will readily adhere.

Any grade of sharp white sea sand, granulated or powdered flint or crushed steel may be used as an abrasive and when propelled by the air through the sand blast nozzle it cuts into the surface of the article producing a roughened effect directly in proportion to the grade used, whether fine, coarse or medium.

Now a great many articles are given a mat or satin finish by means of scratch brushing using fine coarse metal wire brushes. This requires skill on the part of the operator in order that just the right effect be produced continuously. Other articles are finished by dipping in acids, but this practice is subject to the enactment of restrictive laws, the acid of course being dangerous.

These objections do not apply to low pressure sand blasting. Think of a square box-like cabinet somewhat like a paint spray hood except that it is entirely enclosed. You stand in front of the machine just like a bookkeeper at his high desk and in fact with very little more preparation, if any.

There are two openings in the front of the machine through which you push your hands. Those openings usually have cloth cuffs or sleeves which fit snugly around the wrists, preventing the dust from the sand blasting operation from coming through and out into the room.

All the work is done inside this cabinet under the nozzle which is in the centre. You hold the article under the nozzle and watch it being sand blasted through the glass window in the front of the cabinet.

The flow of sand is regulated by a pressure of your foot on a foot treadle and as you watch the article if you think one little spot needs just a little touch more of the blast you touch your foot on the treadle and a spurt of sand at the nozzle does it.

A supply of your articles which of course are small and light enough to be conveniently handled in this way has been put into a wire tray or basket through the side door of the cabinet before beginning operations. This lot is laid directly under the nozzle in such a position as to receive the benefit of the impact of the rebounding sand from each article actually being held in your hand under the nozzle.

As each article is lifted from the wire tray under the nozzle it is, as will be seen from the above, already partially sandblasted so that the time required to touch it up under the nozzle by hand is greatly reduced.

And now where's all this sand coming from and where's it all going to after it leaves the nozzle? Well it drops to the bottom of the machine just where it came from and it comes up again through the pipe to the nozzle and repeats over and over again continuously so that only about a pail of abrasive is all that is required, and this lasts for many days.

Of course from the constant bombarding of thousands of articles daily this sand gradually becomes broken into still smaller grains, becomes pulverized to such an extent that the sand stream eventually loses its cutting force. So when this is noticed it is only necessary to add a little more sand to the supply in the machine to keep it up to its standard of efficiency.

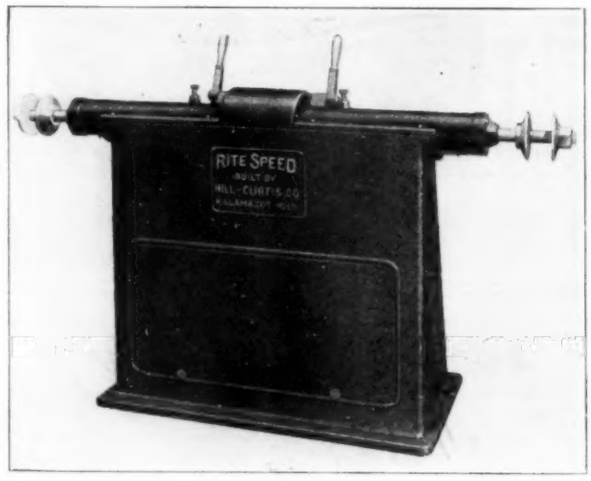
In practice the basket method above will be found better than the travelling belt. In using a belt or other conveyor most articles would be blown away as soon as struck by the sand stream and the operator would spend a great part of his time retrieving them.

A sand blasting machine of this type is not expensive. In fact it is very low in price. The air supply you may possibly already have; in fact most probably you will find it in the blower you use for agitating your plating solutions, running your gas furnaces or blowing stampings or chips from your presses or other machine tools.

Radio and electric light bulbs may be frosted partly or entirely or letters stencilled on the glass or on the metallic or bakelite bases. Lettering or fancy designs may be stencilled on plate glass or on drinking glasses or bottles. All sorts of articles in all sorts of materials come within the scope of this truly amazing factory operation. All in all it is a labor saving operation, a sales increasing finish in itself, a means for increasing the effectiveness and longevity of other finishes and withal a health-promoting process that may be installed in any type of factory at comparatively slight expense.

Two-Spindle Polisher

Hill-Curtis Company, Kalamazoo, Mich., is preparing to market a new two-spindle electric polishing machine. This machine is similar in general design to the single spindle lathe made by the Hill-Curtis Company, except that it is designed with two entirely



Twin-Spindle Polishing Lathe

independent spindles, having two motors mounted in the base and two separate starting switches and brakes.

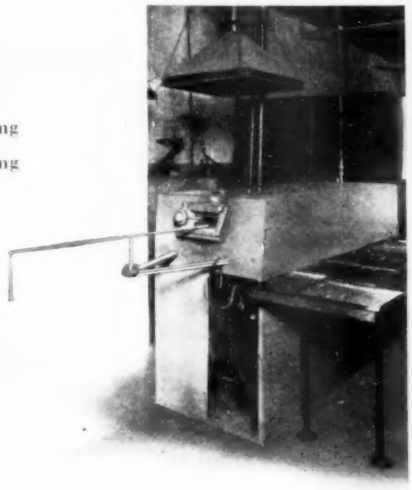
The power is transmitted to the spindle by means of a Multi-V Belt. Each motor and spindle can be started and stopped independently of the other and each spindle can be operated at different speeds. The speed of the machine can be changed by changing motor pulley.

These machines are equipped with Hill-Curtis combination switch and brake, (patent applied for) eliminating the possibility of applying brake before cutting off the current. With one push forward on the lever, the brake is released and the motor started. In reversing this action, the current is cut off and the brake applied.

Bright Annealing Furnace

Weisberg & Greenwald, 71 W. 45th Street, New York, announce the Brandt furnace for which they are sales agents.

The Brandt furnace anneals, solders or heat treats such metals as nickel silver, gold, etc., without oxidizing them. It is said to deoxidize metal that has been blackened by exposure to the flame of a blow torch. It is peculiarly adaptable to those industries which use nickel silver, sterling silver, gold, etc. in large quantities.



Annealing, Soldering and Heat Treating Furnace

These metals harden under the blows of a press or drop hammer to such an extent that many parts or designs cannot be produced without repeated annealing. In ordinary furnaces the work is oxidized making it necessary to "bright dip" in some kind of acid. This bright dipping is a troublesome and expensive process.

In the Brandt furnace, oxidizing, it is claimed, is impossible; therefore, bright dipping is eliminated. The parts annealed come from the Brandt furnace brighter than they went in.

Furthermore, the annealing is done under controlled conditions. It is possible to anneal the work very much better so that more severe operations may be performed between anneals.

The Brandt furnace is also said to make great savings in soldering cost. The usual method in soldering is to set up or charge the work, then heat it and blow the solder into place with a blow torch after which the parts are bright dipped to remove the oxides.

By the Brandt method the parts are held together by appropriate means, the solder is placed in the proper position and trays full of work are put into the furnace to come out cool, bright and finished from the discharge end.

Centrifugal Acid Pumps

The U. S. Stoneware Company, 50 Church street, New York, has put out a new line of centrifugal acid pumps, (chemical stoneware lined) with efficiencies which are said to approximate those of all metal pumps under similar conditions. This line is called the U. S. Standard Centrifugal Acid Pump.

The pumps are recommended for the handling of acids, alkalies, chemicals and all corrosive solutions, weak or strong with the exception of hydrofluoric acid.

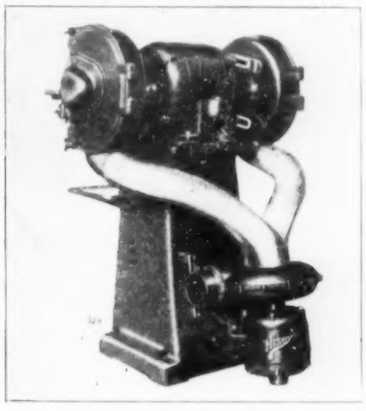
The impellers are of the non-clogging type with the fluid passages arranged to handle solids in suspension without difficulty. A metal bushing is cast integral with the impeller where the shaft goes through. This metal bushing is machine threaded and the impeller is mounted directly over the steel shaft, thereby eliminating impeller breakage as experienced with the older types of stoneware lined pumps.

The metal bushing is fully protected and sealed against contact with the fluid handled, by the shaft sleeve and stoneware nut threaded on the outer end of the shaft. Complete ball bearing equipment is furnished, consisting of extra heavy, deep-groove ball bearings, mounted in a dirt and dust proof bearing housing. There is provision for grease lubrication as well as for Alemite grease gun connections. The bearing unit consists of one held bearing which maintains the rotor in positive position and prevents lateral movement, absorbing at the same time, any lateral thrust of the rotor. The second bearing floats and allows for expansion and contraction of the rotor due to change of temperature. A patent application is pending on this feature.

A chemical stoneware priming cock is provided for the pump discharge. This is a very substantially constructed valve, protected with armor plates. It is fitted with metal rigging for holding and rotating the plug. The pump inlet is provided with a chemical stoneware 90° elbow. Cast iron clamps and bolts are furnished for attaching the elbow and priming cock to the pump.

Exhauster Equipment

Hisey-Wolf Machine Company, Cincinnati, Ohio, is manufacturing an all ball bearing motor driven type of exhauster equipment, designed for grinders of 10, 12 and 14 inch wheel capacity; also for buffing and polishing machine of 8, 10 and 12 inch wheel capacity.



Exhauster Equipment Mounted on Grinding Machine

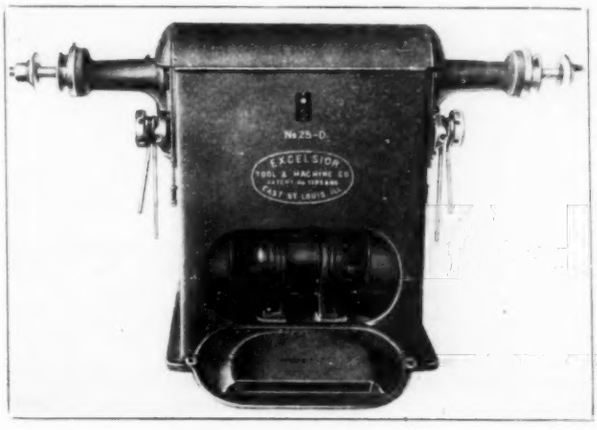
One automatic motor starter simultaneously controls both motors.

Double Spindle Polisher

Excelsior Tool and Machine Company, East St. Louis, Ill., is manufacturing a new type of polishing and buffing machine called the double spindle No. 25-D. This machine has the motor in the base and dust proof ball bearings throughout.

On the back of the housing is a retainer shelf for the abrasive compound handy for each operator. It also has a slot for the spindle wrench and an extension on each side which can be used to attach the dust hoods or collectors.

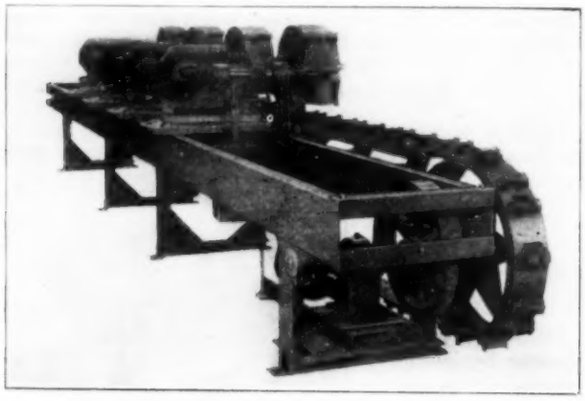
Any make or type of motor can be installed. There are two separate spindles on one stand without any operating parts between the motor and the spindles. Speed can be regulated between 1500 and 3000 R. P. M. There are no shifters, loose pulleys, belt idlers or overhead dust-carrying belts and there are no operating or revolving parts between the motor and the spindles; only the motor and spindles require lubrication.



Double Spindle Polisher

Grinding, Polishing and Buffing Machine

Kent-Owens Machine Company, 958 Wall Street, Toledo, Ohio, has announced an improved grinding, buffing and polishing machine, designed especially for bumper rails, running board strips, show case, refrigerator and other trimmings, flat iron bases, lock and switch plates, hardware, small tools and many other parts.



Four-Head Polishing Machine

The illustration shows a four-head machine equipped with bumper rail fixtures and motors but without overhead exhaust system. Any number of heads can be provided. Wheel pressure upon work is adjustable from 0 to 200 pounds while the machine is in operation. The angular wheel adjustment permits a setting of wheels at angles up to 10 degrees to the right or left of the line of work travel. Driving is by means of flexible V-belt from motor spindle.

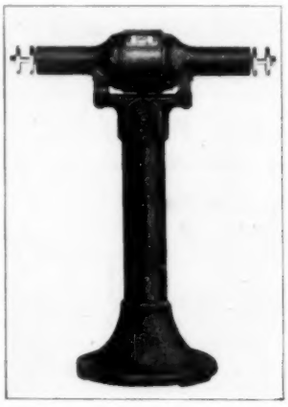
The work belt is steel faced, riding on roller bearings supports beneath the wheel contact area, thus it is said, eliminating belt stretch.

Pedestal Type Buffer

Sterling Electric Motors, Inc., Telegraph Road and Atlantic Boulevard, Los Angeles, Calif., is making a new line of electric grinders, buffers and polishers. These machines are air cooled and incorporate a number of unusual features. They are also said to be lower in price than other similar lines on the market.

This line includes the following items: bench grinders, ¼ H. P. 3600 R. P. M., floor pedestal grinders, ½ to 5 H. P., and up to 3600 R. P. M.

The Sterling company also supplies guards, motors, eye-shields, switches and other accessories.



At Right—

Pedestal Type Lathe for Grinding, Polishing and Buffing

New Chromium Plating Process

A new chromium plating process is offered by the Electroplaters' Technical Institute, 619 Wellington Avenue, Chicago, Ill. This Institute is in the business of teaching electroplaters and training them in all branches of plating work. It offers the "Superchrome" plating process as a part of its regular course for the regular tuition fee, without extra charge.

It is claimed the Superchrome has a high throwing power, is easy to maintain and simple to control. Complete data including formulae, method of mixing, tank construction, equipment installation, etc., are given as a part of this course.

Equipment and Supply Catalogs

Houghton on Industrial Plant Lubrication. E. F. Houghton and Company, Philadelphia, Pa.

Pickling Tank Temperature Control. The Weaver Brothers Company, Adrian, Mich.

Type FD (4") Pyrometers. Roller-Smith Company, 233 Broadway, New York City.

Ferro Pickle Pills. The Weaver Brothers Company, Clinton, Mich. Circular on pills for testing pickling solutions.

Classifications of Metal Specialties. Industrial Metal Company, Philadelphia, Pa. Interesting list of names and definitions.

When Committees Decide. Ferro Enamel Supply Company, Cleveland, Ohio. Interior views of porcelain enameling installations.

I-Witnesses. Semet-Solvay Company, 61 Broadway, New York City. Leaflet on paint for prevention of rust and corrosion of steel.

The Story of New York Today. The Merchants' Association of New York, New York City. Interesting data on America's greatest city.

Built to Meet Your Requirements. Chicago Flexible Shaft Company, Chicago, Ill. Broadside on Stewart furnaces and heat treating equipment.

Arc Welding Data. Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa. Bulletin No. 7, Maintenance by the Electric Arc.

Guaranteed Electric Motors. The Fuerst-Friedman Company, Cleveland, Ohio. Motors, motor-generators, compressors and other electrical equipment; catalog.

Mitchell Polishing, Buffing and Grinding Machinery. The Mitchell Engineering Company, Springfield, Ohio. Catalog, 31 pages, bound in paper and well illustrated.

Hoke, Incorporated. 22 Albany Street, New York City, publications: Hoke-Phoenix Devices for Control of Compressed Gases; Hoke Ammonia Controls; The Hoke Flo-Gage.

Low Pressure Type Rotary Positive Blowers. The P. H. and F. M. Roots Company, Connersville, Indiana. Covers foundry and furnace blowers as well as other. Illustrated booklet.

A New Era in Air Pumps. Leiman Brothers, Inc., 23 Walker Street, New York City. Air pressure blowers, gas and vacuum pumps and other equipment described in an illustrated booklet.

The Monotron Hardness Indicator and Its Work. The Shore Instrument and Manufacturing Company, Jamaica, Long Island, N. Y. An interesting paper on the constant-diameter hardness indicator.

Divine Canvas Cushion Caster and Truck Wheels. Divine Brothers Company, Inc., Utica, N. Y. A complete, illustrated catalog, No. 22, of wheels and casters for varied industrial and other purposes.

The Ferro Check Book. Ferro Enameling Company, Cleveland, Ohio. Control methods and laboratory practices used in manufacture of porcelain enamel frit. Book is 44 pages, bound and illustrated. Free on request to the company.

DeVilbiss Portable Spray-Painting Equipment. The DeVilbiss Company, Toledo, Ohio. An interesting illustrated catalog, combining excellent engineering and educational data on various spray painting devices as well as cataloging some of the company's products in this line.

Foundry Molding Machines. The Tabor Manufacturing Company, Philadelphia, Pa. Handsome loose-leaf folder containing a variety of interesting data on molding machinery; fully illustrated; a very fine example of the combination of engineering data and commercial cataloging. Of interest to every foundryman.

General Electric Company, Schenectady, N. Y. New Pub-

lications: Novalux Floodlight Projectors; Direct Heat Electric Furnaces; G-E Industrial Heating Devices; Centrifugal Compressors, Geared Units; Enclosed, Fan-Cooled D-C Motors; Magnetic Switch for Induction Motors; Electric Furnaces for Vitreous Enameling.

Mechanical World Year Book—1929. Emmott and Company, Ltd., 65 King Street, Manchester, Eng. A handy compendium of mechanical engineering data, suitable chiefly for British use, since many of the fields covered are peculiar to Great Britain and its possessions, and much of the material is presented in terms not used in the United States. It is a very authoritative work which is revised yearly. The price is 1s. 6d., net. Similarly, the **Mechanical World Electrical Pocket Book—1929** gives a large amount of electrical engineering data in equally authoritative fashion, but on which the same comment is necessary as to its greater use to British than to American engineers. This is also published at 1s. 6d. net.

Associations and Societies

REPORTS OF THE CURRENT PROCEEDINGS OF THE VARIOUS ORGANIZATIONS

American Electroplaters' Association

HEADQUARTERS, CARE OF GEORGE GEHLING, 5001 EDMUND STREET, PHILADELPHIA, PA.

Hartford-Connecticut Valley Branch

HEADQUARTERS, CARE OF VERNON GRANT, 43 PUTNAM STREET, BRISTOL, CONNECTICUT

Second Annual Banquet and Session

The second annual educational session and banquet of the Hartford-Connecticut Valley Branch of the American Electroplaters' Society, held May 11 at the Hotel Bond, Hartford, brought out more than one hundred platers, chemists and plant executives for the session, and over two hundred for the banquet. The meeting was a complete success. Its fine program of papers caused considerable valuable discussion to take place.

George B. Hogaboom of Hanson-VanWinkle-Munning Company, Matawan, N. J., was chairman of the session. The following papers were delivered:

Spotting Out, by W. P. Barrows, American Electroplaters' Society Research Associate at the Bureau of Standards.

Stunts in Lacquering and Enameling, by E. M. Stephenson, The Henry V. Walker Company, New York City.

The Mechanical Side of Chromium Plating, by Walter Rowe, Manning Bowman and Company, Meriden, Conn.

The Corrosion of Electroplated Metals, by Dr. A. Kenneth Graham, Professor of Chemical Engineering, University of Pennsylvania.

The Application of Science to Electroplating, by Edson L. Wood, Landers Frary and Clark, New Britain, Conn.

At the banquet, which consisted of a very excellent dinner, there were a large number of ladies present as well as most of the men who attended the session and a number who did not. The evening was made memorable by the superior program of entertainment provided by the committee of arrangements. A good share of the credit for the fun, however, is due to the mystifying feats of sleight-of-hand performed before the thrilled audience by Bill "Egyptian" Stoddard, renowned master of legerdemain. The evening was completed by dancing to the tune of some very good music.

Los Angeles Branch

HEADQUARTERS, CARE OF M. D. RYNKOFS, 1354 WEST 25TH STREET, LOS ANGELES, CALIFORNIA

The temporary Branch at Los Angeles held another meeting on May 8, the third thus far. There were 38 men present for the dinner which preceded the business session under the chairmanship of Clarence Thornton, temporary chairman of the group. After routine business, Charles Russell took charge and technical discussions were begun.

Dr. I. P. Chandeysson of St. Louis, Mo., gave a very interesting talk on plating generators, and upon request explained the difference between shunt and compound wound motors. Charles Westen of Chicago was also a visitor, and congratulated those present on their move to form a branch in Los Angeles.

John Jacques explained an article in the American Electro Chemical Society Review on the "Beret cathode test for determining optitruirium ratio of chromic acid to sulphate in chromium plating baths." This was of great interest to all present, and some have already improved their chrome solutions by using this test.

Among the questions in question box was "How can white metal or brittania metal be silver plated without blistering?" Charles Russell gave a good explanation of why this metal is hard to clean and suggested a strip composed of 11 ozs. sodium cyanide and 4 ozs. caustic soda; reverse current; dip in straight muriatic acid; rinse; scratch brush or buff; clean in usual way; rinse; dip in 10% solution muriatic acid; rinse; strike in rich silver strike; then silver plate in regular solution.

From all indications, Los Angeles is going to have a lively branch. Any Californian desiring to join this branch should advise M. D. Rynkofs, 1354 West 25th Street, Los Angeles, Calif.

Philadelphia Branch

HEADQUARTERS, CARE OF PHILIP UHL, 2432 NORTH 29TH STREET, PHILADELPHIA, PA.

New Officers Elected

New officers of the Philadelphia Branch of the American Electroplaters' Society were elected at the regular monthly meeting held at the University of Pennsylvania, May 3, 1929. The following were named:

President, W. M. Scott; vice-president, S. A. Lunbeck; secretary-treasurer, Philip Uhl; librarian, A. Hirsch. The last two named were re-elected.

Board of managers: J. Underwood, H. Snyder, W. P. Scott.

Delegates: George Gehling, Philip Uhl and S. T. Lunbeck; alternates: P. Kurzeknabe, W. M. Berenato and A. J. Shaffer.

George Gehling, previous president of the Branch, was compelled by pressure of personal affairs to decline renomination for the office. He had been president of the Branch for eight years and is now supreme secretary of the American Electroplaters' Society. Mr. Gehling stated, however, that he planned to give as much time as possible to the affairs of the Branch and the Society in general.

After the business part of the meeting was concluded, a number of problems in the Branch's "Question Box" were answered by various members. There was a very large attendance.

PHILLIP UHL, Secretary.

Rochester Branch

HEADQUARTERS, CARE OF C. GRIFFIN, 24 GARSON AVENUE, ROCHESTER, N. Y.

New officers were elected at a meeting held May 17, as follows: Clarence Reama, president; William Hart, vice-president; Charles Griffin, secretary-treasurer; Thomas Harper, librarian. Board of Managers: S. P. Gartland, Frank Mesek, R. P. Lopez. Convention Delegates: S. P. Gartland, R. P. Lopez, F. C. Mesle.

The next meeting, it was decided, will be held Saturday evening, July 20, at Buffalo, N. Y. All who are interested are urged to attend. A good speaker will address the meeting.

American Society for Testing Materials

HEADQUARTERS, 1315 SPRUCE STREET, PHILADELPHIA, PA.

Annual Meeting June 24-28, 1929

The thirty-second annual meeting of the American Society for Testing Materials will be held at the Chalfonte-Haddon Hall, Atlantic City, N. J., June 24-28, 1929. An unusually strong program is offered in non-ferrous metals. Two entire sessions are devoted to the presentation of papers and reports, special emphasis being laid on the papers dealing with tests on copper alloy sheet materials and papers in the aluminum alloy field. The third award of the Charles B. Dudley Medal established by the Society for recognition of meritorious papers on research in engineering materials will be made to J. J. Kanter and L. W. Spring of the Crane Company, Chicago.

The Marburg lecturer for this year will be Dr. Saul Dushman, assistant director of the research laboratory of the General Electric Company, Schenectady, N. Y., who will speak on "The Nature of Cohesive Forces in Solids." This lecture will be held at 4 P. M. on Wednesday, June 26th. Dr. Dushman has long been associated with studies of the atomic and crystal structure of metals.

New Officers

The following names for officers are announced:

FOR PRESIDENT:

T. D. Lynch, consulting metallurgical engineer, Westinghouse Electric and Manufacturing Company, E. Pittsburgh, Pa.

FOR VICE-PRESIDENT:

F. O. Clements, technical director, Research Laboratories, General Motors Corporation, Detroit, Mich.

FOR MEMBERS OF EXECUTIVE COMMITTEE:

G. B. Haven, Professor of machine design, in charge of textile laboratory, Massachusetts Institute of Technology, Cambridge, Mass.

C. R. Hook, vice-president and general manager, American Rolling Mills Company, Middletown, Ohio.

H. E. Smith, engineer of materials, New York Central Lines, New York City.

G. E. Warren, assistant general manager, Portland Cement Association, Chicago.

Committee on Copper Alloys

Committee B-5 on Copper and Copper Alloys, Cast and Wrought, made up of two sub-committees formerly under Committee B-2, held a formal organization meeting in New York on February 19th. C. H. Mathewson, Professor of Metallurgy, Yale University, was elected chairman and N. L. Mochel, metallurgical engineer, Westinghouse Electric and Manufacturing Company, was elected secretary. W. R. Webster and N. K. B. Patch were continued as chairmen respectively of the Sub-Committee on Wrought Metals and Alloys and the Sub-Committee on Sand Cast Metals and Alloys, formerly under Committee B-2.

The committee is recommending the advancement to standard of the tentative revisions of the specifications for cartridge brass discs, cartridge brass, seamless admiralty condenser tubes, brass rod for use in screw machines, and for naval brass rods.

Lighting Equipment Association

HEADQUARTERS, 711 GRAYBAR BUILDING, NEW YORK CITY

Mid-Summer Meeting

The Artistic Lighting Equipment Association held its Mid-Summer Meeting at the Chelsea Hotel, Atlantic City, N. J., June 5th, 6th, 7th and 8th. The meeting was held during the exhibition and convention of the National Electric Light Association, which is celebrating the Fiftieth Anniversary of the invention of the electric light.

The Annual Banquet of the Association was held June 7th in Westminister Hall of the Chelsea Hotel.

British Institute of Metals

HEADQUARTERS, 36 VICTORIA STREET, WESTMINSTER, LONDON, S.W.1., ENGLAND

Sir Oliver Lodge on Metals

Sir Oliver Lodge, F.R.S., delivered the Nineteenth Annual May Lecture before the Institute of Metals on Tuesday, May 7. The title of the lecture—"Some Ideas About Metals"—was sufficiently broad to enable Sir Oliver to give one of his characteristic and enlightening discourses.

Personals

H. W. Gillett

H. W. Gillett, chief of the Division of Metallurgy, Bureau of Standards, Washington, D. C., has resigned his post as of July 1, 1929, to assume the directorship of the Battelle Memorial Institute, Columbus, Ohio.

H. W. Gillett

Dr. Gillett was born in 1883. He graduated from Cornell University and then worked for a short time in the laboratories of Thomas A. Edison, and Arthur D. Little of Boston. This work was followed by a period of graduate study and instructing at Cornell after which he went with the Aluminum Castings Company to install their first laboratories.

Dr. Gillett joined the U. S. Bureau of Mines in 1912 at their station in Ithaca, N. Y., for the purpose of studying brass melting practice. He was the first to undertake the development of the rocking electric brass furnace, which later appeared on the market as the Detroit Rocking Electric Furnace. In 1925 he was appointed Chief of the Division of Metallurgy of the United States Bureau of Standards.

Sam Tour

Sam Tour, as briefly announced in our previous issue, has been elected a vice-president and a director of Lucius Pitkin, Inc., analytical and consulting chemists, assayers and metallurgists, with offices and laboratories in the Pitkin Building, 47 Fulton Street, New York City. Mr. Tour will take charge of a branch of the company at 123 North Street, Batavia, N. Y., where Mr. Tour formerly carried on a general consulting practice which has been merged with the Pitkin firm. Mr. Tour is widely known in metallurgical circles as a past chairman of both the New York and the Washington Chapters of the American Society for Steel Treating, secretary of the A. S. T. M. Committee B-3 on Corrosion of Non-Ferrous Metals and Alloys; a member of the American Institute of Mining and Metallurgical Engineers, the American Chemical Society, Society of Automotive Engineers, and the two organizations previously mentioned.

Sam Tour

Previous to entering the consulting field for himself, Mr. Tour was metallurgist for the Doehler Die Casting Corporation, New York.

D. H. Wray

D. H. Wray of Henry Wray & Sons, Inc., Rochester, N. Y., was elected a director of the American Foundrymen's Association at the last meeting of that Association in Chicago, Ill., April 8-11, 1929. (See THE METAL INDUSTRY for May, 1929, page 210-214.)

D. H. Wray

Mr. Wray was born in 1881 in Rochester, N. Y. He attended local schools and Phillips Andover Academy in Massachusetts. He entered his business career with the Economy Cream Separator Company of Rochester, in 1904, remaining with this company in its various branches and departments until 1907 when he went with the National Brass Manufacturing Company, also of Rochester. In 1910 he joined Henry Wray & Sons, Inc., of Rochester. All of the above companies were close corporations under family control.

In 1907 Mr. Wray married Irene Warner of Rochester. They have four children, Lois Warner Wray, 19; Irene Wray, 17; D. H. Wray, Jr., 13; Charles F. Wray, 10.

Mr. Wray comes of an old family of brass founders. Three generations ago Henry Wray left Derby, England, to come to America. In 1842 he established a brass foundry in Rochester where the family has remained ever since, engaging in various allied lines of business. Mr. Wray is vice-president of Henry Wray & Son, Inc., in which he is associated with his brother, Charles F. Wray. He is also president of the National Brass Manufacturing Company, manufacturers of bronze faucets.

Arthur W. Gray, Ph.D., has joined the staff of The Brown Instrument Company, Philadelphia, Pa., as associate director of research. He will be engaged mainly in the development of scientific and industrial instruments.

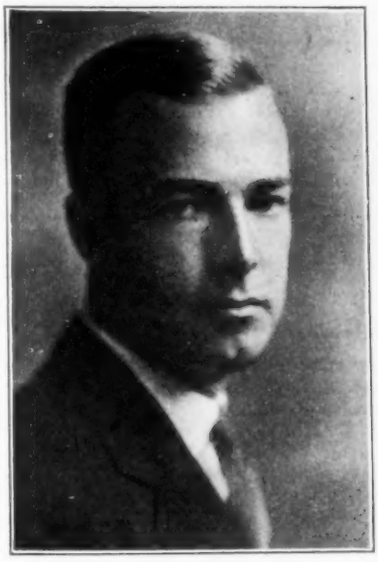
O. B. Stauffer has been appointed manager of the architectural department of the John Harsch Bronze and Foundry Company, Cleveland, Ohio. He was formerly sales manager of the Forest City Structural Steel Company, Cleveland.

Louis E. Price of Chicago, Ill., has been elected president of Price Brothers, Inc., Chicago sign manufacturers, for his seventh successive term. He was also renamed president of its subsidiary, the Atlas Bronze Manufacturing Company, Chicago, producers of metal signs, memorials and tablets. Mr. Price started only a few years ago as a bronze filer with C. H. Hanson and Company, gaining a first-hand knowledge of manufacturing. A short time later he left that concern and went into the merchandising of bank equipment, his business gradually growing into the firm of which he is now the head, one of the largest of its kind in the world.

George Gehling, widely known in the electroplating field as an executive of the American Electroplaters' Society, has left the Elevator Supplies Company, Hoboken, N. J., and returned to his home in Philadelphia, Pa., due to the illness of his wife. Besides his activities as secretay-treasurer of the Electroplaters' Society, Mr. Gehling was president of the Philadelphia Branch of the Society for eight years. A short time ago, however, he was compelled to decline renomination to the latter office due to pressure of business. He remains, however, a member of the Branch and will be active as a delegate to the coming International Convention at Detroit, as well as in other directions where he can do so without interrupting important personal matters.

William T. Powers

William T. Powers has been placed in charge of the New York office of the Tolhurst Machine Works of Troy, N. Y. This office was recently moved to the Hudson Terminal Building, 30 Church Street, at which time Mr. Powers' appointment took effect. Previously he served the company as engineer in the New England and Midwestern territories. He has had wide experience in the application of centrifugal machinery to the process industries and also is well versed in the production problems of such industries, the company states. Manufacturers in the New York district will now be able to avail themselves of Mr. Powers' services and advice in the matter of centrifugal apparatus, the wide application of which has extended the uses of this machinery to include extraction, draining, clarifying, impregnation and thickening.



William T. Powers

W. W. Bricka of New York City has been appointed general manager of the Goodell-Pratt Company, Greenfield, Mass., manufacturers of small tools.

S. D. Den Uyl was recently elected secretary of the Bohn Aluminum and Brass Corporation, Detroit, Mich., to succeed A. P. Lauer, who continues as a director.

Erskine B. Mayo has been re-elected president of Lucius Pitkin, Inc., analytical and consulting chemists, assayers and metallurgists, 47 Fulton Street, New York City. Thomas A. Wright has been re-elected technical director of the company.

Chester V. Nass is now superintendent of the brass foundry of Fairbanks Morse and Company, Beloit, Wis. He was previously identified with the Ohio Brass Company, Mansfield, Ohio, as chemist and metallurgist, and also with the Humphreys Manufacturing Company of the same city.

Louis E. Murphy has been president of E. F. Houghton and Company, leather and oil manufacturers of Philadelphia, Pa. Mr. Murphy succeeds the late Charles E. Carpenter as head of the company. A. E. Carpenter was elected first vice-president and treasurer, and George W. Pressell second vice-president and secretary.

M. W. Elmendorf has joined the engineering division of the Taylor Instrument Companies, Rochester, N. Y., where he will be chief draughtsman. He was formerly chief draughtsman and assistant factory manager of the Pfaudler Company, Rochester. Mr. Elmendorf states he has made the change in order to broaden his experience.

Charles H. Proctor of the Roessler and Hasslacher Chemical Company, New York, addressed the Chicago Job Platers' Association on May 3, taking as his subject the question: "Are We Justified in the Belief that Chromium Plating is a Commercial Process?" The address was well received and the association urged Mr. Proctor to address it again on some future date.

A. P. Munning, 2nd, has returned to the United States from Kobe, Japan, where he was identified with A. P. Munning and Company, Inc., Division of the Hanson-Van Winkle-Munning Company of Matawan, N. J., manufacturers of electroplating and polishing equipment and supplies. Mr. Munning will assume direction of the research department of the company at Matawan.

Milford H. Corbin, chemical engineer, is now a member of the technical staff of The Roxalin Flexible Lacquer Company,

Inc., of Long Island City, New York. Mr. Corbin, as research chemist with L. F. Grammes and Sons, metal nameplate manufacturers of Allentown, Pa., established their chemical laboratory and conducted some interesting investigations in the finishing, plating and etching of metals. His last connection, with the Litho Etching Corporation, carried him through their consolidation with the Electro Chemical Engraving Company as director of research.

Louis J. Jenner has been appointed polishing sales engineer of The Federal Abrasives Company, Birmingham, Alabama. He has had many years of practical experience in this field. Commencing training under his father, who had charge of the polishing, buffing and plating department for A. G. Spalding and Brother, then manufacturers of bicycles, Mr. Jenner has successively been in charge of the polishing and plating department for one of the automobile makers and one of the large talking machine manufacturers.

Stephen S. Tuthill has resigned from his position as secretary of the American Zinc Institute, effective August 1, 1929. Mr. Tuthill has been the active head of the Zinc Institute for some years and has gained wide recognition for his work on behalf of the zinc industry, for which he directed a broad campaign with a view to popularizing and extending the uses of the metal. He was also instrumental in the work of gathering accurate statistics with regard to zinc. Mr. Tuthill states that for the present his plans are not formed, except that he intends to take a six-week vacation in the Adirondacks immediately after the beginning of August.

Obituaries

Clayton M. DeMott

Clayton Merle DeMott, treasurer of the Scovill Manufacturing Company, Waterbury, Conn., died at his home in that city on May 12, 1929. He was born at Perinton, N. Y., April 23, 1860, the son of Lieutenant Charles DeMott, who was killed in action at Cold Harbor while with the Union Army, and Elmira (Ketcham) DeMott, who was a sister of the wife of the late Chauncey P. Goss, Sr., of Waterbury, former president of the Scovill Manufacturing Company.

Clayton M. DeMott

He started to work while in his teens with only a public school education. He came to Waterbury in 1879 and entered the employ of the Scovill Manufacturing Company as a shipping clerk. He became a director of the company in 1903 and its assistant secretary shortly after. Later he was made its treasurer. He was married in Waterbury to Minnie Lathrop, April 23, 1885. His wife and a son, Clayton M. DeMott, Jr., survive. —W. R. B.

William C. Cochrane

William C. Cochrane, 45 years old, vice-president of the Detroit Brass and Malleable Works, died last month at his home in that city after an illness of ten days.

Mr. Cochrane was born in Baltimore and for 20 years had been engaged in the brass manufacturing business. At one time he was associated with the Kelly Jones Company, Pittsburgh, Pa. Eight years ago he came to Detroit as general superintendent of Detroit Brass and Malleable Works. Later he was made a vice-president. He was well known in the Detroit trade.—F. J. H.

Frank Hammond

Frank Hammond of Rochester, New Hampshire, formerly engaged in the brass foundry business at Union, N. H., died suddenly on May 7, 1929, while out fishing near North Wakefield, N. H. Mr. Hammond was 84 years of age. Before retirement he owned a brass foundry at Union.

George H. Braman

George H. Braman, 59 years old, production superintendent of the American Brass Company, died June 1, 1929, after a period of ill health. The news was received as this issue was going to press. A complete report will be contained in the July number.

Frank E. Westerman

Frank E. Westerman, general superintendent of The Michigan Copper and Brass Company Division of The Republic Brass Corporation, Detroit, Mich., was accidentally killed by an automobile in the yards of the company on April 9th, 1929.

Mr. Westerman was born in Hotchkissville, Conn., 45 years ago. His experience in the brass, copper and aluminum industry had been extensive. He specialized in the extrusion of non-ferrous metals for many years. He was at one time with the American Brass Company at Ansonia, Conn., as foreman of the extrusion department, later going to Bristol, Conn., as superintendent of the Bristol Brass Company's rod and extrusion mill. He went to Detroit in 1918 as superintendent and developed the extrusion business of the Michigan Copper and Brass Company. In 1927 he was appointed general superintendent.

Frank E. Westerman

Mr. Westerman leaves a widow and three children, three brothers and four sisters.

Henry A. Ross

Henry A. Ross, president of the Ross-Tacony Crucible Company, Philadelphia, Pa., died May 10, 1929, at his home in Philadelphia. Mr. Ross, who was 63 years of age, succeeded his father as head of the company in 1898, when the elder Ross died. The company was founded in 1871.

G. Evans Avery

G. Evans Avery, 53 years of age, sales manager of the American Metal Products Company, Milwaukee, Wis., died on May 21, 1929, after a long illness.

Mr. Avery had been with the American Metal Products Company for ten years.

Casper Reichl

Casper Reichl, for 16 years secretary and manager of the Spring City Foundry Company, Waukesha, Wis., died April 15, 1929, following a surgical operation.

Mr. Reichl was born April 24, 1869, at Milwaukee. He started his foundry career with the Milwaukee Bronze Casting Company, Milwaukee, and was connected with the firm for 12 years.

In 1911 he organized the Spring City Foundry Company, of which he was manager until he retired from business in 1927.

Fred M. Carr

Fred M. Carr, prominent silverware and novelty manufacturer of West Somerville, Mass., died on May 3, 1929, at his home at Winchester, Mass. He was 59 years of age. Mr. Carr was born in Somerville, Mass. He graduated from Tufts College in 1897 and entered the manufacturing business of his father, becoming president of the firm upon his father's death.

John G. Dietz

John G. Dietz, one of the organizers of the Capitol Brass Works, Detroit, Mich., more than 20 years ago, and a well-known business man, died at his home in that city last month. He was 62 years old. In late years he had been associated with his brother, William Dietz, in the real estate business.

—F. J. H.

Solomon B. Stein

Solomon B. Stein, proprietor of the A. K. S. Jewelry Manufacturing Company, 74 West 46th Street, New York City, committed suicide last month. He was 36 years of age.

William Oliver

William Oliver

William Oliver, formerly master mechanic at the plants of the Rome Copper and Brass Company, Rome, N. Y., died last month at the home of his daughter at Hastings, N. Y., where Mr. Oliver was living in retirement.

Mr. Oliver came to this country about 49 years ago, settling at Ansonia, where he became associated with the Farrell company. After some years he went to Rome, N. Y., where he became master mechanic of the brass firm there and constructed much of that company's machinery as it expanded. Ten years ago he retired.

News of the Industry

Industrial and Financial Events

Chase Companies Merge with Kennecott

Merger of the Chase Companies, Inc., with the Kennecott Copper Corporation was announced here last month. The deal involves a stock transfer whereby the Kennecott Corporation acquires the local concern, giving Kennecott stock in return. As the Chase family owns all the stock of the local company the terms of the transfer were not given out and estimates given by brokers as to the probable figure put on the Chase Companies vary from $25,000,000 to $50,000,000. The company has never issued any financial statements. The consensus of opinion is that the price was slightly under $40,000,000. As the Kennecott Corporation is assumed to be worth in the neighborhood of $750,000,000, it is assumed that the owners of the Chase Companies will receive something more than a one-twentieth interest in the Kennecott Corporation in return for the local concern.

The Chase Companies will operate under the same management as before and the name will continue to be used on all its plants and products and in connection with its advertising. The management has assured its employes that there will be absolutely no change in the personnel and that they need have no alarm because of the merger. The Chase Companies consist of the Chase Metal Works and Waterville Machine Works in Waterville, a suburb of Waterbury, the Chase Rolling Mill and Waterbury Manufacturing Company of Waterbury, and a new rolling mill now being built in Cleveland. It owns the Chase Brass and Copper Company, a selling subsidiary, which has a string of warehouses across the country including those of the former U. T. Hungerford Company.

The foundation of the company was established through the Waterbury Manufacturing Company of which the late A. S. Chase obtained control many years ago. He was at that time president of the Benedict and Burnham Company and the Holmes, Booth and Hayden Company, firms that later became part of the American Brass Company. The other plants of the Chase Companies were established between 1900 and 1912, Chase Companies, Inc., being formed to take them over a few years later. A. S. Chase was succeeded by his son, the late H. S. Chase, who died in 1918. Frederick S. Chase, brother of H. S. Chase, is now president and treasurer of the concern. All the stock in the companies has always been held within the Chase family. Another brother, Irving H. Chase, is president of the Waterbury Clock Company.

Announcement of the merger immediately started the report that the Scovill Manufacturing Company might also be acquired by Kennecott but this seems doubtful as Scovill's, while a larger concern, does not consume so much copper as Chase's, its bent being more the manufacture of brass goods. The idea is based on the theory that Kennecott, having bought one brass manufacturing plant, may have to build or acquire others in order to find a market for all its copper production, as it is felt many of its present customers may not care to buy from a concern that owns a brass firm that is a competitor of theirs. Consequently, the report is that Kennecott is more likely to acquire the American Smelting and Refining Company, the newly organized Republic Brass Company or the General Cable Company. There is a community of interest here as American Smelting owns substantial interests in both Republic Brass and General Cable, while the latter concern also owns an interest in Republic Brass. The Guggenheims have substantial holdings in both Kennecott and American smelting and are represented on both boards of directors.

—W. R. B.

Ingot Brass Prices Reported

Non-Ferrous Ingot Metal Institute reports the average prices per pound received by its membership on commercial grades of the six principal mixtures of ingot brass during the twenty-eight-day period ending May 24, as listed below. As there are, as yet, no generally accepted specifications for ingot brass, it must be understood that each item listed below is a compilation representing numerous sales of metal known to the trade by the designation shown, but each item, in reality, including many variations in formulas. Until the program of standardizing the principal specifications, now progressing in co-operation with the American Society for Testing Materials, is completed, the following specifications will be understood to refer to "commercial grades."

Commercial 80-10-10 (1% impurities)	17.465c.
Commercial 78% metal	15.524c.
Commercial 81% metal	15.767c.
Commercial 83% metal	16.096c.
Commercial 85-5-5-5	16.392c.
Commercial No. 1 yellow brass ingot	13.565c.

The combined deliveries of brass and bronze ingots and billets by the members of the Non-Ferrous Ingot Metal Institute for the month of April, 1929, amounted to a total of 10,199 tons, against 11,208 tons in March, according to announcement made by the Institute.

Aluminum Company of America

In a decision handed down on June 3, the United States Supreme Court declined to review the suit of George E. Haskell against the estate of the late James B. Duke and the Aluminum Company of America for breach of a contract said to have been made between Duke and Haskell whereby they would manufacture aluminum in competition with the Aluminum Company of America. The Supreme Court decision upholds a recent decision of the Court of Appeals in which a previous court ruling awarding Haskell $8,000,000 was reversed.

The Aluminum Company of America, Pittsburgh, Pa., appeared last month in the United States Supreme Court to defend an action brought against it by William B. Scarborough, member of a New York banking firm, who alleged that as a minority stockholder in the Aluminum Die Casting Company, Garwood, N. J., he suffered financial losses through the sale of that company to the United States Aluminum Company, subsidiary of the Aluminum Company of America. He alleged that the die casting firm was sold at a figure lower than its actual value in order to eliminate him as a stockholder and give the Aluminum Company of America complete control of the Garwood plants.

Roessler and Hasslacher Chemical Company

The Roessler and Hasslacher Chemical Company, New York City, held its annual outing on May 25, at Glen Cove, Long Island. There were approximately 200 guests. The managers of several branch offices in the East were present. After a spirited ball game, a show was staged by the men and women employees of the company.

In the evening a chicken dinner was served. Milton Kutz, vice-president and manager of sales, presented platinum watches to some employees of the company who had been with the organization for 25 years or more and who had not already received gifts in recognition of their services. The following employees of the company were so honored: Miss S. Dinant, Miss G. Warren, Miss J. Paulson, Miss L. Chorlton, William Mohr, J. V. Muller, Albert Reusch, W. P. Stoll, A. C. Klahre, F. A. Deisler, J. A. Brimlow, Carl Dittmar and John Baumgartner.

American Brass Company Earnings

The earnings of the American Brass Company, Waterbury, Conn., a subsidiary of the Anaconda Copper Mining Company, for 1929 will amount to about $8,500,000, according to an estimate in the "Wall Street Journal," daily financial paper. The paper states that from indications now visible, American Brass will ship over 1,000,000,000 pounds of finished and semi-finished products from its plants this year, which would mean profits of about $9,500,000. Allowing for a possible decline of even 10 per cent in business during the second half of 1929, the earnings should total about $8,500,000, it is stated.

Metal Men Sign Dry Law Plea

Three prominent men in the non-ferrous industries appeared among the signers of an appeal to the American people to give the Eighteenth Amendment to the Constitution a fair trial. The appeal was signed by twenty prominent Americans, including Thomas A. Edison and Henry Ford. The metal men were Frederick S. Chase, president, Chase Companies, Inc., Waterbury, Conn.; Fred W. Ramsey, director, Cleveland Metal Products Company, Cleveland, Ohio, and Ambrose Swasey, of The Warner and Swasey Company, Cleveland, Ohio.

National Chromium Corporation Expansion

The National Chromium Corporation, 200 Varick street, New York City, reports that due to increased business within the past two and one-half months it has expanded its production capacity considerably. According to the statement, made by Sidney Satenstein, president, the polishing department has been expanded by 60 per cent of its former capacity; the nickel department by 38 per cent; and the chromium plating capacity by 55 per cent. These expansions represent an increase of 51 per cent in the general plant capacity since February, 1929.

Production of Copper in 1928

The year 1928 was marked by the largest production of refined copper from domestic and foreign sources ever made in the United States, according to the United States Bureau of Mines, Department of Commerce In response to the heavy demand manifested in the latter part of the year, mine production was greatly increased. Smelter production is necessarily slower than mine production to respond to the demands of the market, but it was also increased largely and established a new peace-time record of smelter production from domestic ores. The increase in the price of electrolytic copper to a monthly average of 15.9 cents a pound in December, the highest since April, 1923, was instrumental in bringing forth the large increases noted. The increase in production, however, was not sufficient to offset the increase in deliveries, and stocks of refined copper at the end of 1928 were lower than they had been since the end of 1917. Blister stocks were larger than at the end of 1927, but total blister and refined stocks also were the lowest since 1917. Domestic withdrawals were indicated to be 1,608,538,878 pounds, exceeded only by those of 1918, 1,661,669,576 pounds. Imports of unmanufactured copper in 1928 were the highest on record and exports of metallic copper were exceeded only by the exports of 1917, when they were 1,125,647,336 pounds.

K. F. Griffiths Buff Company, Inc.

The K. F. Griffiths Buff Company, Inc., which has changed its firm name to the MacFarland Manufacturing Company, Inc., which will continue their executive offices at 110 East 42nd street, New York City. L. W. MacFarland, who was the president and the active head of the K. F. Griffiths Buff Company, Inc., continues in that capacity in the new organization. The sales organization has been retained but enlarged.

Many improvements have been made in the plant, equipment and method of manufacturing. An approximate 40 per cent increase in equipment has been necessary in the past few months to take care of the volume of business which the company has enjoyed, it is stated.

Primary Lead Statistics

The output of refined primary lead in the United States, from domestic ore, amounted in 1928 to 626,202 short tons, valued at $72,639,000, as shown by reports made by producers to the United States Bureau of Mines, Department of Commerce. The production was 6 per cent less than in 1927 and the value was nearly 14 per cent less. The greater percentage of decrease in the value of lead produced was due to the decrease in the average selling value of lead from 6.3 cents a pound in 1927 to 5.8 cents in 1928.

The apparent consumption of refined primary lead in the United States in 1928 amounted to about 658,000 short tons, as compared with about 663,000 tons in 1927.

Scrap Copper in Army Sale

The United States Ordnance Depot, Charleston, S. C., offers among several lots of scrap materials to be disposed of, one lot consisting of 230,831 pounds scrap copper salvaged from discarded shells. Terms of disposal require the successful bidder to offer in exchange for the material an amount of smokeless powder for the 75 mm. gun, model 1897. Sealed bids should be at the depot named above before 11 a. m., Eastern Standard Time, June 17, 1929, at which time bids will be opened.

Scrap Metals in Panama Canal Sale

The general purchasing officer of The Panama Canal will sell a large quantity of materials to highest bidders on June 21, 1929. Materials include quantities of bronze, copper, Monel metal, brass, zinc plate and sheet lead. Schedule No. 1968 describing the material and giving terms of sale can be obtained from General Purchasing Officer, The Panama Canal, whose address is Washington, D. C.

Business Papers Conference

The National Conference of Business Papers Editors held a meeting at Washington, D. C., June 3, 1929, which consisted of conferences with the following: Secretary of War Good; Secretary of State Stimson; Attorney-General Mitchell; Secretary of the Interior Wilbur; dinner with Secretary of State Stimson; and a luncheon at the National Press Club, during which the editorial awards by the Associated Business Papers were made.

Brass Companies Exhibit Products

Brass and other metal manufacturing companies were prominent exhibitors at the Better Homes Exposition held at Waterbury, Conn., May 20 to 25, 1929. Among those who displayed products were the Chase Companies, Inc., American Brass Company, Scovill Manufacturing Company and others.

Scovill Manufacturing Company

Scovill Manufacturing Company, Waterbury, Conn., last month declared a quarterly dividend of $1 a share, or a rate of $4 annually. Previously, 75 cents a quarter, or $3 annually, was paid on the Scovill stock.

International Nickel Company

The International Nickel Company of Canada, Ltd., which recently merged with the Mond Nickel Company, Ltd., reports net profits of $5,590,191 for the quarter ended March 31, 1929.

Bohn Aluminum and Brass Company

The Bohn Aluminum and Brass Company, Detroit, Mich., last month declared the usual extra dividend of 50 cents and the regular quarterly dividend of 75 cents on its shares.

General Cable Corporation

The General Cable Corporation, New York, reports net income of $1,024,971 after interest, taxes and charges, for the quarter ended March 31, 1929, as against $370,845 in the same 1928 period.

New Companies

Ainsworth Manufacturing Corporation, Detroit, Mich., has been incorporated with capital stock of $2,000,000 and has taken over the Ainsworth Manufacturing Company, manufacturer of automobile windshields, stampings, rolled shapes and machine parts. The following departments are operated: tool room, rolling mill, stamping, plating, polishing, grinding room, lacquering.

Newark Galvanizing Company, 39 Verona Avenue, Newark, N. J., has opened a plant to be used exclusively for hot galvanizing work and is operating on production scale. Plant has most modern equipment and control apparatus for work of all sizes. **Theodore Hayes** is general manager. The company is a direct subsidiary of the **Atlas Fence Company. Frank C. Zuch** is president of the new firm.

Business Reports of The Metal Industry Correspondents

New England States

Waterbury, Conn.

JUNE 1, 1929

The rumored acquisition of the **Randolph-Clowes Company** by the **American Brass Company** is still unsettled. Officials of both concerns admit that conversations have been held on the subject but say they were in very elementary form.

Stockholders of the **Scovill Manufacturing Company** at their quarterly meeting last month elected **H. Lamson Scovill** of Ampere, N. J., a director to succeed the late **Clayton M. DeMott,** whose death is recorded elsewhere in this issue. Mr. Scovill is a son of the late **Henry W. Scovill** of this city and a descendant of one of the founders of the company. He was born in this city December 1, 1880, and went to New Jersey 20 years ago. He is president of the **Oil Jack Company** of Ampere. The directors of the company at the same meeting increased the regular quarterly dividend from 75 cents to $1.00. Last year the dividend was increased from 60 to 75 cents. An extra dividend of 20 cents was paid April 1. The stock was split up two years ago and is now selling at around $63 a share.

The Beardsley and Wolcott Manufacturing Company is beginning to concentrate its activities at the recently acquired plant of the **Berbecker and Rowland Company** in Waterville, near here. About 50 members of the office force of the Maple street plant, formerly the **Novelty Manufacturing Company,** have been transferred to the Waterville office and the transfer of machinery, employes and manufacturing activities from the former Wolcott plant in Hartford is about completed. **Charles E. Beardsley,** president of the company, is also president of the **Bridgeport Brass Company.**

E. W. Goss of the **Scovill Manufacturing Company** and **Peary Cohen** of the **Waterbury Button Company** were in Washington last month appealing to the Connecticut senators and representatives to have the tariff rates on buttons, buckles and nails increased in the new tariff act.

The Waterbury Machine and Metal Company has filed papers of incorporation calling for a capitalization of $50,000, with 500 shares of common stock.

Ralph G. Colter, of the local plant of the **Chromium Corporation of America,** was the principal speaker at the meeting of the Young Men's Club last month. He described the various uses of chromium and told of the heavy demand for it at present from automobile manufacturers.

The American Brass Company, Scovill Manufacturing Company and **Chase Companies, Inc.,** had extensive exhibits at the **Better Homes Exposition** at the Armory last month. In each case the booths were built of attractively arranged sections of brass tubes, sheets, etc., showing the various types and colors of the metal, while inside were displayed hundreds of smaller manufactured articles of brass and copper.

The French Manufacturing Company has appealed to the board of aldermen for amendment of the zoning ordinance so that it can build a factory addition on its own land on Robbins street. The company claims the ordinance was based on an obsolete map which showed a non-existent street running through its property and as a result its property on one side of this street was put in the residential zone when it should have been in the industrial zone.

Thomas D. Robinson, formerly president of the **Robinson Machine Company,** which recently merged with the **Cole Nut Company** of Peekskill, N. Y., under the name of the **Robinson Cole Grip Nut Company** has brought suit against the company, alleging mismanagement, and asking for the appointment of a receiver. The company has a capital stock of $125,000 consisting of 2,500 shares. Of this, Mr. Robinson holds 1,775 shares. The complaint alleges that the presence of attachments and lack of ready cash has endangered the assets of the corporation. The corporation is solvent, however, as it is the owner of a number of patent rights of considerable value.

The American Brass Company will earn $8,500,000 of the total $90,000,000 expected to be earned by the entire Anaconda group during 1929, it is reported.

E. H. Davis of the **Scovill Manufacturing Company** ad-

dressed the Men's Club of St. Paul's Church last month. He spoke on the great adaptability of brass, telling how it is worked to all shapes, sizes and thicknesses in the local shops without altering its character and of its manifold uses.

Charles T. Brennan has received a patent and assigned it to the **E. J. Manville Machine Company** for double stroke solid die headers and **Henry S. Woolley** has received a patent which he has assigned to the **Bristol Company** for a fitting for measuring instruments.

The **Chamber of Commerce** reports a total of 35,529 people employed in local factories employing 100 or over for the month of April, an increase of 2,460 compared to the same month last year. In the eight largest factories, 19,809 were employed, an increase of 1,645 over last year. During the month 6,500 square feet of floor space was added to the **Blake and Johnson Company** factory and 6,000 square feet to the **Bristol Company.**

Edward O. Goss, president of the **Scovill Manufacturing Company,** was one of the principal speakers at the meeting of the **Connecticut Society of Civil Engineers** held here last month. The visitors inspected the American Brass plant, seeing the sheet mills, cold rolling of brass from breaking down to finishing, drawing of seamless tubes from billets to pipe; and the **French Manufacturing Company,** where they saw specialty manufacture of small brass and copper tubing. They saw the movie, "From Mine to Consumer," shown by the Anaconda Co. —W. R. B.

Connecticut Notes

JUNE 1, 1929

BRIDGEPORT—Authorization has been granted by the legislature for an increase in the capital stock of the **Bridgeport Brass Company** from $3,600,000 to $15,000,000. The increased capital will be used in connection with an expansion program to be started within the next year.

Plans have been completed for a new office building for the **American Tube and Stamping Company.** It will be erected just east of the Yellow Mill bridge.

The Connecticut Chamber of Commerce, in a recent release, states that Bridgeport has startled New England within the last two years by its remarkable industrial comeback from the most serious depression that hit any city after the war. This revival is due largely to the activities of the industrial bureau of the local chamber in bringing new factories here, it states. Special mention is made of the **Sikorsky Aviation Corporation** which expects to be employing 1,900 men within a year. One of its factories is almost finished and operations will start within a few months.

The Whittelsey Manufacturing Company, an outgrowth of the **Whittelsey Body Company,** which has been manufacturing automobile bodies for several years, is starting the manufacture of the "Avro Avian" land and sea planes. The company has 200,000 shares of common stock at $12.50 a share. It has a factory with 75,000 feet of floor space expects to manufacture 1,000 planes during the coming year.

A permit for a $100,000 steel frame manufacturing building has been taken out by the **Crane Company** and a permit for a $13,000 addition has been taken out by the **Bridgeport Hardware Manufacturing Company.**

The Dictaphone Corporation has declared an extra dividend of 50 cents a share on the common stock payable June 1 to stock of record May 17.

Approximately 75 old employes of the **Columbia Phonograph Company** have been given $30,000, to be distributed among them according to their service, by **Lewis Sterling,** chairman of the board, to observe his 50th birthday.

The Seymour Company, which specializes in the manufacture of metal novelties, has located here and is building a factory with 80,000 feet of floor space. Two more units are to be built within a year and within that time it expects to be employing 500 hands. An industrial siding is also planned. This is the sixth industrial firm to locate here within four months, the others being the **Elwood Electric Company,** the **Health Brunnell Toy Company,** the **American Fabritory Company** and **Louis M. Mesner.** Ten new factories employing over 600 hands have located here within the last year, five of them coming from outside the state.

BRISTOL—The Bristol Brass Company is understood to have earned $125,000 after depreciation but before federal taxes in the first quarter of 1929. This compares with $100,000 for the first quarter of 1928, or 25 per cent ahead of a year ago. At this rate it would show for the year about $7 a share on the common compared with $5.20 in 1928. The month of March showed that it produced about 3,000,000 pounds of brass with April running considerably ahead.

The New Departure Manufacturing Company is starting the second step in its $4,000,000 building program with the erection of a second addition of five stories at its main plant. A strip of land adjoining the plant has been purchased for future additions.

The Wallace Barnes Company is moving into the additions completed within the last few months. Building operations are underway at the **E. Ingraham Company** and a six-story addition is expected to be completed within a few months. An addition of two stories, to be used as a "movement" shop, will be ready within three months.

MERIDEN—The International Silver Company had a net income for the first quarter of the year of $268,819 after depreciation, interest and federal taxes, equivalent after allowing for 7 per cent preferred dividends, to $1.79 a share on the common. This compares with $236,018 or $1.43 a share for the first quarter of 1928.

HARTFORD—About 250 assemblers of the **Underwood-Elliott-Fisher Company** walked out on a strike after their demand for an increase in wages was refused. The company officials declare things are progressing satisfactorily at the plant, with plenty of labor available. The strikers assert that attempts made by the company to transfer men from other departments to take their jobs have been unsuccessful, the men refusing to be "strike breakers," and that the company's production has slowed down to an alarming extent.

BERLIN—The Stanley Chemical Company, subsidiary of the **Stanley Works,** of New Britain, is building a one-story addition of 70 by 40 feet and expect to have it ready for increased production by August.

WINSTED—The Winsted Manufacturers Association elected the following officers at its annual meeting last month: President, **Norman F. Thompson;** vice-president, **Luther L. Chase;** secretary and treasurer, **O. G. Williams;** executive committee, **Robert E. Maher, Lewis T. Stone** and **Robert J. Leighton.** The nominating committee consisted of **M. S. Fitzgerald, R. E. Gaylord** and **H. E. Norton.** It was voted to omit meetings during July and August.

NEW LONDON—Salvaging operations to recover $75,000 worth of copper bars have been started by the **Merritt-Chapman and Scott Corporation.** The copper was in the "Winceco," a vessel which sank off New London in February.

NEW BRITAIN—Carlton J. Ward, vice-president and general manager of the **Hartford Machine Screw Corporation,** addressed the local chapter of the **American Society of Mechanical Engineers** at their meeting here last night, branding lack of balanced judgment, unthoughtful decisions and too little general knowledge as intangible wastes in industry. Of the 16,000,000 people at work in factories throughout the country, only 4 per cent are capable of leadership and 12 per cent capable for supervision, the rest are of value only as workers, he said.

NEW HAVEN—As part of its refinancing program, the **New Haven Clock Company** is offering an issue of 6½ per cent cumulative preferred stock and a limited amount of common stock. Under the proposed program the company will have an authorized issue of $1,500,000 preferred, of which $750,000 will be outstanding and 150,000 shares, no par common, of which 71,960 will be outstanding. The company was organized in 1857. Sales for 1928 aggregated $4,270,240 and net profits were $293,076 after expenses and taxes, or the equivalent of $6.05 times preferred dividend requirements, and earnings after preferred dividends based on the new capitalization were equal to $3.42 a share on the outstanding common. —W. R. B.

Providence, R. I.

JUNE 1, 1929

The arrival of better spring weather has brought with it a decided improvement in all lines of the metal trades, especially

those connected with the building and jewelry manufacturing industries. This has caused corresponding stimulation in small tools and machinery, so that all along the line there is the best industrial activity in a long time. Reports from all sides indicate a continuance of this improved condition for an indefinite period.

Owing to the recent rapid rise in the price of brass and other upward changes in the prices of commodities essential to the jewelry findings business, representatives of several findings manufacturers recently met and took steps toward formation of a findings manufacturers' board of trade or association. The concerns represented at the meeting held May 22, at which it was decided to form such an organization, were: Fulford Manufacturing Company, George H. Fuller and Son Company of Pawtucket, Jewelers' Supply Company, Josiah Walsham Company, the T. W. Lind Company, Goodwin and Gregory, Providence Art Metal Company, Roland and Whytock and A. Vester and Sons, Inc. A committee was appointed to decide upon a name and draft by-laws. The following officers were elected: president, **Frank E. Farnham** of the Jewelers' Supply Company; vice-president, **Ralph Gregory** of Goodwin and Gregory; secretary, **Harold R. Barker** of the Fulford Manufacturing Company, treasurer, **William G. Lind** of the T. W. Lind Company.

The modern Plating Company has been incorporated under the laws of Rhode Island with a capital of $10,800, the incorporators being **Philip F. Eddy, Samuel Nathanson** and **Louis E. Giusti.**

During the past month the **International Chromium Plating Corporation,** 36 Garnet street, has been working on an overtime schedule to keep its orders filled. It has recently discarded all of its old equipment and installed the most modern apparatus, with especial attention to jewelry work.

James H. MacLean is owner and operator of the **MacLean Job Polishing Company** at 226 Eddy Street, according to his statement filed at the city clerk's office.

Parks Bros. and Rogers, Inc., manufacturing jewelers at 7 Beverly street, has been incorporated under the laws of Rhode Island with a capital stock consisting of 500 shares of common no value. The incorporators are **Everett I. Rogers, E. Irving Rogers, Jr.,** and **William P. Young.**

The Fray Ring Company of Providence has been incorporated under the laws of Rhode Island to conduct a manufacturing jewelry business with an authorized capital consisting of 500 shares of common stock of no par value. The incorporators are **Russell R. Fray, R. R. LeDuc** and **Leroy E. Brown.**

Aran Shenhan, Lera Shenhan and **Frank Summers,** all of Providence, have incorporated **The Shenhan Company** under the laws of Rhode Island for the purpose of doing electroplating. The incorporation provides for 500 shares of no par value common stock.

The Phillips Wire Company of Pawtucket, a branch of the **General Cable Corporation,** has under option additional land adjoining its plant with a view to the eventual enlargement of the rolling mill department. If the plans now in contemplation are carried out, the officials report that equipment for the rolling of heavier copper bars will be installed.

The E. Millimather Company has purchased the stock, tools, machinery, fixtures etc., and good will of the **George L. Vose Company,** manufacturing jewelers at 86 Page street, Providence, and will continue the manufacture of a line of costume jewelry under the latter name.

The Supreme Manufacturing Company, manufacturers of jewelry novelties and ornaments, have removed from 61 Peck Street to larger quarters in the new Doran Building at 15 Elbow Street. —W. H. M.

Middle Atlantic States

Newark, N. J.

JUNE 1, 1929

The Hanovia Chemical and Manufacturing Company has purchased the factory buildings and land at 100 Chestnut Street.

The Marvin Radio Tube Corporation has purchased a new building next to its factory at 76 Colt Street, Irvington, N. J. The addition gives the company 20,000 square feet of space. Arrangements are being made to install a quantity of tube equipment in the new building.

The Hy-Vac Company, manufacturers of radio tubes, has leased a building at 36 Spring Street, Newark.

The Star Electric Motor Company, of 134 Miller Street, manufacturers of motors, dynamos and other electrical equipment, have purchased three and one-half acres of land on Riverside Avenue. **E. E. Hollander,** president of the company, and **C. M. Peterson,** secretary, announce that contracts have been awarded for the erection of a manufacturing plant.

The Marino Auto and Metal Works, Inc., which has taken over a factory in Waynewood Park. The company is now operating with a 24-hour shift at its electroplating plant on Central Avenue, Plainfield, N. J. The concern plates 400 pairs of lamp brackets daily for Ford cars. The work is done for the **Aluminum Die Casting Company** of Garwood, which is expected to increase its production to 1,000 pairs of brackets daily for the **Ford Motor Company.** The concern also plates a carload of tinplate a month for a New Brunswick factory. The electroplating plant will remain in its present location.

The Aluminum Die Casting Company, owned by the **Walker M. Levett Company** of East 25th Street, New York, has moved into the plant of the **Spicer Manufacturing Company** at South Plainfield, N. J. The Aluminum concern was purchased by the **Plainfield Manufacturing Company** from the Levett concern. The new owners will make many improvements to the old Spicer plant to include sand moulding and die casting. The new concern will employ about 100. —C. A. L.

Trenton, N. J.

JUNE 1, 1929

Work is soon to be started on a four-story building for the **Magnetic Pigment Company** on Woolverton Street. The improvement will represent an outlay of $90,000. The structure will be 113 by 67 feet of concrete, steel and brick. The building will be connected with another unit of the company by a three-story bridge. The pigment company is rushed with orders.

Wherry and Hutchenson have begun the erection of a warehouse on West Hanover Street. It will be two stories with a store in front and the company's offices on the second floor. The building will be completed by fall and will cost $60,000. The company wholesales in electrical supplies and will now increase its lines. **William G. Wherry,** president of the **Skillman Hardware Manufacturing Company,** is a member of the firm.

Departing from the strict regulation of refusing to allow societies and organizations to visit its expansive plant here, **The John A. Roebling's Sons Company** granted permission to the **New York Electrical Society** to inspect the shops recently. The special dispensation was made to permit the members of the society to view personally the machines and apparatus which have turned out many gigantic jobs in New York and vicinity. Heretofore only technical students at colleges have been permitted to enter the gates for inspection purposes. That rule was designed to prevent interruption of work. A special train brought the members of the Electrical Society to Trenton from New York. Guides met the members at the gates and escorted them through the various departments of the plant. After a careful inspection the party went to Roebling, N. J., where the members were guests of the company at luncheon. The trip was made to acquaint the members with the immensity of the plant.

Captain Siegfried Roebling, vice-president of the John A.

Roebling's Sons Company, Trenton, N. J., and **Miss Mildred K. Kunath,** secretary of the **Cochran Motors Company,** Bordentown, N. J., were recently married in New York City. Mr. and Mrs. Roebling are now on a honeymoon in Europe. They will visit several foreign countries, and will be absent for the remainder of the summer.

J. Philip Bird, of Jersey City, was recently elected president of the **Manufacturers' Association of New Jersey** for the seventeenth time at the annual convention at Atlantic City. Other officers were re-elected as follows: **John W. Ferguson,** of Paterson, and **Charles W. Crane,** of Elizabeth, vice-presidents; **W. C. Billman,** of Trenton, secretary; and **Harry D. Leavitt,** of Trenton, treasurer. Fourteen trustees were re-elected and one new trustee chosen. In the annual financial statement submitted at the convention, assets of $2,635,811.98 for the past year were reported, leaving a net worth of $2,216,267.18. The assets show a comparative gain of more than $400,000 over the preceding year.

—C. A. L.

Middle Western States

Detroit, Mich.

JUNE 1, 1929

There has been no change of any consequence in business conditions in the Detroit area during the last month. Practically every plant that has anything to do with the brass, copper, aluminum or gray iron industry is operating just as vigorously as it has for many weeks. Until the last few months these plants catered largely to the motor car industry. Now the airplane industry is beginning to be felt intensely in the Detroit area. Numerous companies are entering the field at frequent intervals and the older ones are constantly announcing expansions. Then, in connection with all this, there is the refrigeration industry, which also is making extensive strides. With so many sources of business the non-ferrous metal plants are having about all they can do to keep up with demand. Probably at no time in the history of Detroit and the entire Great Lakes area have business conditions been so promising in this particular field. Production in nearly every plant that caters to the lines here mentioned have orders ahead that will carry them along until well into next fall.

Members of the **Detroit Branch** of the American Electroplaters' Society are eagerly looking toward the coming of their International Convention which opens in this city on July 8 and continues until July 11. It is expected to be the best the organization has ever held.

The Parker Rust Proof Company, 2177 Milwaukee Avenue, has been incorporated for $19,550 and 130,000 shares no par value.

Charles F. Lambert, president of the **Clayton and Lambert Manufacturing Company,** Detroit, has recently been made a director of the National Bank of Commerce. It is stated that Mr. Lambert is the third generation of his family to be affiliated with the Clayton and Lambert firm. Early in 1925 he accepted control of the company and put through a most successful reorganization.

Alfred V. Verville, secretary of the **Verville Aircraft Company,** Detroit, recently announced plans for the immediate production of 100 planes. This schedule is based on the response to the first public showing of the new Verville recently. Temporary quarters, embracing 100,000 square feet, have been obtained in a plant at 7424 Melville Avenue, but the company is seeking a site adjoining an airport on which to erect a new factory.

The General Smelting and Refining Company, Detroit, recently increased its capital stock from $10,000 to $15,000 according to a recent announcement.

R. U. McIntosh, president and general manager, announces the organization of the **Mack-craft Amphibian Corporation,** which will acquire facilities at Detroit for the manufacture of transport cruisers. It is stated the first plane will be completed about August 1.

First quarter earnings of the **C. M. Hall Lamp Company,** Detroit, manufacturers of automobile lamps, were equivalent after all charges to $411,549. This compares with $193,774 earned in the same period last year. Sales for the first quarter gained 60 per cent over the like period in 1928, it was announced.

Walkerville, Ont., across the river from Detroit, has been chosen as the site for the Canadian plant of the **Stout Metal Airplane Company.**

Tentative plans are being considered for the manufacture of airplanes in Detroit by the **Blackburn Airplane Company, Ltd.,** of England, a $10,000,000 corporation, according to Major F. A. Bumpus, chief engineer of the Blackburn organization, at a recent gathering of the Canadian Club in Detroit.

The Wise Industries, Detroit, recently changed its name to **Detroit Plating Industries,** it is announced.

Aluminum Industries, Inc., announces the purchase of the **Diamond Motor Parts Company,** St. Cloud, Minn. The **Diamond Company** is a large producer of replacement parts.

In order to take care of constantly increasing sales volume, the **Warner Aircraft Corporation,** Detroit, manufacturers of the Warner "Scarab," air-cooled, seven-cylinder, radial aeroplane, is erecting a new factory on a six-acre tract at the Town Line Road and the Eight Mile Road, about one and one half miles from the Municipal airport.

The Built-Well Battery Company, Bay City, Mich., has been taken over by the **Bilt-Well Manufacturing Company,** according to **T. A. Bartlett,** president of the **Bartlett Electric Products Company,** Goshen, Ind., parent company of the Bay City concern. The plant will be moved to 309 Third street where operations will be resumed. T. R. Peterson, former co-partner in the organization, will act as general manager of the plant, it is stated.

The Hayes Body Corporation, according to announcement, has increased production at its Indianapolis plant, devoted exclusively to the manufacture of Marmon bodies, by 65 bodies a day, bringing the total output of this plant to 300 bodies daily. Hayes' May schedule calls for an output which will show sales of around $4,000,000 as compared with sales of $2,750,000 in May last year.

The General Brass Company, Detroit, recently changed its capital stock from 362,500 shares preferred and 60,000 shares of no par value to 60,000 shares of no par value and $908,692.

Funeral services for **Joseph J. Wilson,** 73 years old, formerly general foundry manager for the **General Motors Corporation,** were held in Detroit on May 28. Mr. Wilson died at his home in Akron, N. Y. He had retired from active business and for the last three years had been living in New York state. Mr. Wilson is credited with having instituted many innovations in foundry practice, some of which are said to have led to the development of suitable engine block and piston castings for motor cars.

—F. J. H.

Toledo, Ohio

JUNE 1, 1929

The first half of the year is making a good showing in Toledo plating and non-ferrous metal industries. The plating industry is particularly active. Practically every plant in the city is operating at capacity and has orders ahead that assure steady production for a considerable time.

The same report comes from most of the plating plants connected with other industries such as the manufacturer of surgical instruments, motor car parts, etc.

The outlook in every line where plating and metals are concerned is considered generally favorable.

As during past months, the motor car industry and its accessory plants are operating at capacity. Many of these plants are producing for the Detroit trade and have all they can do to keep ahead of orders. During the present spring

some of the Toledo plants have been producing for the airplane industry, which at present is making unusual strides. New airplane plants are coming into the field right along and others are in sight. Even with the present facilities, manufacturers, as a rule, say they are unable to keep up with the demand. The airplane industry is gradually getting into the run with the motor car industry and already is being profoundly felt in the non-ferrous metal field, which is being called upon to assist in production just as it is called upon to assist in producing requirements for the motor car industry.

Toledo platers are anticipating with much interest the coming **International Convention** of the **American Platers' Society** at Detroit, July 8 to July 11. This city has a large platers' organization and many of its members take a prominent part in the affairs of the national organization. They plan to be well represented at the big Detroit convention.

Monroe, Mich., is so near Toledo and the Ohio line that it might be well to include it in the Toledo manufacturing area. The development of Monroe into an automobile manufacturing center is seen in the announcement of the reorganization of the **Mead Machine Company** there. The new organization, with a paid in capital of $25,000, is expected to make it possible for the company to expand. At present the company has contracts for the manufacture of marine motors. A minimum of 30 motors a month are to be built for a ten-month period; force feed lubricators for steam, Diesel and gas engines in four sizes are also being built.

—F. J. H.

Cleveland, Ohio

JUNE 1, 1929

Like other manufacturing centers in the Great Lakes area, Cleveland is experiencing a substantial run of business, particularly in the metal and plating fields. While much of this is sustained by the motor car and airplane industries, there are numerous other plants not so allied that also are making a considerable showing.

Individual plating plants are more or less engaged on diversified products. But in general much of the work may be traced to the airplane or motor car demands.

The brass, copper and aluminum plants are producing more or less for the airplane and the motor car industries also. Detroit manufacturers are depending on Cleveland to a large extent.

In general, the non-ferrous metal lines in the Cleveland area are in a favorable position.

Purchase of the **Wills-St. Clair** automobile factory at Marysville, Mich., a few miles north of Detroit, by the **Great Lakes Aircraft Corporation,** Cleveland, was announced on May 17 by company officials. Acquisition of this modern factory of more than 350,000 square feet of floor area is a part of the Great Lakes' expansion program by which it expects to produce a complete line of commercial aircraft in addition to the training planes it now manufactures.

In a recently published experimental distribution census of the **Cuyahoga Company,** Ohio, it was shown that a large part of the $55,000,000 worth of semi-finished parts purchased during 1927 by Cleveland automobile manufacturers were purchased from Detroit and Flint companies.

Announcement is made that the **LeBlond Aircraft Engine Corporation,** Cincinnati, has undertaken the manufacture of five and seven radial, aircooled aircraft motors designed by **Glenn D. Angle,** Detroit, and for which a nine and one-half acre plant is being made ready in the Ohio city. During the last few weeks two engines a day have been produced, but this is being increased to ten a day with new factory facilities.

—F. J. H.

Illinois Notes

JUNE 1, 1929.

The formation of the **Metalcraft Heater Corporation,** a subsidiary of the **Grand Rapids Metalcraft Corporation,** has been announced by **R. W. Hook,** president of the latter concern. The Grand Rapids Metalcraft Corporation has acquired the **Bovey Automobile Heater Company.**

The Rogers Brothers Company, has been incorporated at Batavia with a capital of $50,000, to engage in galvanizing and treatment of metals. Incorporators are D. F., W. H. and A. T. Rogers.

The Speedo Products Company has been incorporated in Chicago with a capital of $3,000, to deal in metal products. Signers of the articles of incorporation are D. L. Beshoar, A. F. Hatton and J. H. Bishop.

The La Salle Metalcraft Company has been incorporated in Chicago to manufacture metal articles. The company has been capitalized at $20,000. Signers of the articles of incorporation are Meyer B. and Maurice Rapaport, A. A. Schy and Herman Rapaport.

—A. P. N.

Wisconsin Notes

JUNE 1, 1929.

G. Evans Avery, 53, sales manager for the **American Metal Products Company,** Milwaukee, died at a hospital in that city, May 21, after a long illness. Mr. Avery had been connected with the American Metal Products Company for seven years. He is survived by his widow and two daughters.

Joseph V. Mettelka, 56, prominent sheet metal products manufacturer of Marshfield, died at his home in that city, on April 26, after a lingering illness. Mr. Mettelka is survived by his widow and two children.

The Merrill Manufacturing Company at Merrill has added a plating department to its plant, providing for both nickel and cadmium plating. Officers of the concern, which has increased its capital by the issuance of $25,000 of preferred stock, are **F. E. Taylor,** president; **John H. Hieb,** vice-president; and **W. J. Tesch,** secretary-treasurer.

—A. P. N.

Other Countries

Birmingham, England

MAY 20, 1929.

The unsettled state of the non-ferrous metals market has been the cause of great anxiety among users in Birmingham and other manufacturing centers. Birmingham particularly uses enormous quantities of brass and copper in the manufacture of all sorts of hardware. Copper, after advancing to nearly £100 in the middle of March, is down to about £80, but the market is not sufficiently settled to attract buyers. Rolling mills and foundries in the district secured their supplies prior to the copper ramp and there has been no interruption in operations, but it is difficult to attract new business in the present conditions. Tin is already at a lower price than it has touched since 1924, and the tinplate makers are becoming alarmed in South Wales lest they should have to revise their prices.

The Water, Steam and Small Gasfittings Section of the **Brassfounders' Employers' Association** held a meeting in Birmingham recently to review the position in regard to prices. In March, when copper was at its highest point, an advance of 15 per cent in these products was declared and the result of the recent meeting was that the manufacturers felt that there was no justification for a reduction in price at present. In coming to their decision they stated that careful consideration was given to the cost of copper in the past. During 1927 the average price of standard copper was £55 15s per ton and in the year 1928, £63 15s. No advance was declared until the early part of 1929, and the increases in copper they contend should, therefore, be considered in comparison with the figures prevailing in 1927.

Midland exports to the United States last quarter as declared at Birmingham represented a total value of $2,505,924 as compared with $2,139,685 for the exports in the corresponding period of last year. In that period brass manufactures declined from $56,867 to $26,439. Iron and steel manufactures totalled $202,189 against $187,161. Plated and silverware was exported to the value of $79,235.

Copper tubes, which on March 25th were 1s 6¼d per pound, are down to 1s 3¼d and brass tubes have been reduced in the same period from 1s 3¼d to 1s 1d basis. It is not surprising, therefore, that buyers are holding off the market and mills have to maintain operations with present orders on the books and very few contracts being made to replace them. One large firm is doing a fair business with Canada. Continental competition is strongly complained of but makers are hopeful that they will be able to hold their own when the metal markets become more stabilized.

The **Standing Committee** appointed under the Merchandise Marks Act has recommended a new marketing order requiring that imported copper plates, sheets, strips, rods, wire and tubes and also spring balances must bear an indication of origin when offered or exposed for sale in the United Kingdom. This order will become operative on June 21. In the case of plates and sheets, the order applies whether they are sold or exposed for sale either wrapped or unwrapped. For strips and other rolled sections and rods, either in bundles or singly; wire in coils, drums or bundles as imported or when re-coiled or re-wound in the United Kingdom; and in respect to tubes of ½ inch or more diameter, and also for sizes below ½ inch, whether exposed for sale singly or in bundles.

Sir Oliver Lodge delivered the 19th annual May lecture before the **Institute of Metals** in London on May 7. Referring to the wonderful new alloys now being produced, he remarked that all who were familiar with metals knew what a great effect a trace of impurity or a slight change of chemical composition might imply. This had been specially notable in the magnetic properties of metals and alloys. For instance, an alloy of iron was now known which had practically no excess of magnetic permeability above unity. Another substance known as permalloy had a high magnetic permeability for very low magnetic forces and was used to surround the core of submarine cables for the purpose of giving the wire extra self induction. "These new alloys," he added, "are not only of practical importance but must be of theoretical interest. Super-permeability may turn out as important theoretically as super-conductivity, though perhaps that is an exaggeration, because super-conductivity is a most remarkable and sensational discovery occurring only when a metal is reduced to a sharp critical point near absolute zero."

—J. A. H.

Business Items—Verified

American Metallurgical Corporation, 27 Von Hillern Street, Boston, Mass., has changed its name to American Electric Furnace Company.

The Hardinge Company has removed to new offices on the 40th floor of the new Chanin Building, 122 East 42nd Street, New York City.

The Bridgeport Brass Company, Bridgeport, Conn., has been authorized by the Connecticut legislature to raise its capital to $15,000,000 from the present $3,600,000.

Charles Hardy, Inc., announce the removal of their offices from 100 East 42nd Street to Chanin Building, 122 East 42nd Street, New York City. The telephone number is Ashland 5740.

Monarch Aluminum Ware Company, Cleveland, Ohio, has removed to its new plant and offices at 9301 Detroit Avenue, where larger quarters and the latest types of labor saving equipment are available.

The British Aluminum Company, Ltd., United States Agency, has removed to the Chanin Building, Suite 1907, 122 East 42nd Street, New York City, **Arthur Seligman** announces. The new telephone numbers are Caledonia 1735-6-7-8.

Fulton-Harwood Brass and Aluminum Company, South Bend, Ind., reports business good and a recent increase in employees. This firm operates the following departments: brass, bronze and aluminum foundry; brass machine shop, plating, polishing, lacquering.

James T. Rich, recently reported to have established a brass, bronze and aluminum foundry at 310 Tenth Street, Knoxville, Tenn., reports that he is the sole owner of the **Service Brass and Metal Works** at that address. The firm, he states, has been there for about five years.

The McAleer Manufacturing Company, Detroit, Mich., has been organized to take over the business formerly operated by the **C. H. McAleer Manufacturing Company.** Active management of the firm will continue to be exercised by **C. H. McAleer** and associates.

Aluminum Goods Manufacturing Company has leased a factory at St. Louis, Mo., to the Wright Aeronautical Corporation, Paterson, N. J., for assembling plant for Gypsy aircraft engines for light planes. Facilities will be provided for 200 engine units per month, to cost about $150,000.

Adolph Marchand, 680 Fifth Avenue, New York, manufacturer of lighting fixtures, has leased space in the building at 208 Rawson Street, Long Island City, for a new plant. The following departments are operated: brass machine shop, soldering, brazing, plating, polishing, grinding room, lacquering.

Cohn and Rosenberger, Inc., Providence, R. I., manufacturers of jewelry novelties, have completed construction of a new, modern factory building and will shortly be installed there. The company operates tool room, stamping and soldering rooms, and a plating, polishing and lacquering department.

Electro Chemical Pattern and Manufacturing Company, 3975 Beaufait Avenue, Detroit, Mich., will erect a one-story addition, 30 x 70 ft. to increase plating facilities for the manufacture of copper patterns, core boxes, cope and drag plates and copper molds for pressing composition carvings. This firm operates a plating department.

Bertram-Bredy Company, 549 W. Washington Boulevard, Chicago, Ill., has been appointed Western representative for the Eureka Metal Products Company, Northeast, Pa., manufacturer of commutators, commutator bars, screw machine parts, drop forgings, and brass, copper, steel and alloy castings. The following departments are operated: brass, bronze and aluminum foundry; brass machine shop.

Uneedaburner Company, care of F. H. Brinkerhoff, 2 Main Street, Belleville, N. J., recently organized by Mr. Brinkerhoff and associates has acquired the former local plant of Eck Dynamo Company, foot of Mills Street, consisting of a two and three-tory factory of about 50,000 feet., and will occupy in part for manufacture of the Alford kindred specialties. W. F. Bolte, East Orange, N. J., is also interested in the new company. The following departments are operated: brass machine shop, tool room, stamping, tinning, soldering.

Multi-cell Radiator Corporation, 80 Terrace Street, Buffalo, N. Y., manufacturer of copper radiators, heating systems, etc., has purchased property at Lockport, N. Y., for a new plant, to cost more than $60,000 with equipment. Arthur B. and Charles A. Harrison are the heads. This firm operates the following departments: smelting and refining, brass, bronze and aluminum foundry; brass machine shop, tool room, casting shop, rolling mill, cutting-up shop, spinning, stamping, zincing, tinning, soldering, brazing, plating, polishing, grinding room, lacquering, japanning.

The Brown Instrument Company, Philadelphia, Pa., has moved its Boston, Mass., office from 161 Devonshire Street, to 1107 Public Service Building, 89 Broad Street, in the same city. This change has been made necessary by the rapid growth of the company's business in the New England territory. Due to increasing volume of business in the Pittsburgh district, the Pittsburgh office of The Brown Instrument Company has moved to larger quarters at 1522 Oliver Building. While the former office was also located in the Oliver Building, the new quarters offer increased facilities.

The Gerity, Whitaker Company, Toledo, Ohio, operating one of the largest exclusively job plating plants in the United States, reports it has just added equipment and floor space which will enable it to employ about 150 men. Hitherto, its

payroll has had about 135 men. The company was established 32 years ago by **James J. Gerity,** who is still president. **James J. Gerity, Jr.,** who is vice-president and manager, states that the company's business at present is largely in chromium plating of automotive parts for manufacturers in the Middle West. The firm has facilities for all plated finishes, natural colors, special finishes and lacquer enameling.

On May 1st, the Chicago district and Central Division Offices of various units of the **Union Carbide and Carbon Corporation** moved to the new forty-story Carbide and Carbon Building at Michigan Avenue and South Water Street, Chicago, Ill. Units of the Union Carbide and Carbon Corporation which will make this new building their Chicago home are: The Linde Air Products Company, The Presto-O-Lite Company, Inc., Oxweld Acetylene Company, Oxweld Railroad Service Company, Union Carbide Sales Company, Carbide and Carbon Chemicals Corporation, National Carbon Company, Inc., Haynes Stellite Company, J. B. Colt Company and Acheson Graphite Company. The building itself is an architectural masterpiece rising over five hundred feet into the air. Handsome bronze doors grace the main entrance on Michigan Avenue. The lobby is two full stories in height, providing an interior of unusual beauty. The wall base is of black and gold marble, with wainscoting of Notre Dame inlaid with bronze. The ceiling is of ornamental plaster finished in various attractive colors. Bronze is featured in the metal trim on the mezzanine floor of the lobby, and on the elevator landing and main stairs.

Review of the Wrought Metal Business

By J. J. WHITEHEAD
President, Whitehead Metal Products Company of New York, Inc.

WRITTEN ESPECIALLY FOR THE METAL INDUSTRY

JUNE 1, 1929.

During April the demand for copper and brass fabricated products steadied after the rather hectic time experienced due to the wide fluctuations in the price of copper metal. The first two weeks of May saw further progress in this direction until toward the close of the month a noticeable pick-up in demand and actual buying occurred. It is believed that confidence in the copper market and, of course, in the fabricated products, has been reestablished. It is believed that the producers by their very wise and able handling of the situation have convinced most users of copper, brass or other copper alloys that they are trying their outmost to have the situation stabilize itself to the mutual advantage of everyone.

Directly following the collapse in the price of the metal everyone was very much excited, but this feeling has now been allayed. We believe, and it is our opinion that the trade generally feels the same way, that a difficult situation has worked out as well as could be expected and that if the metal stabilizes itself around 18c. or between 18c. and 20c. that the coming months will see complete reestablishment of confidence and further increase in the demand for and consumption of copper and products fabricated from it.

The last week of May gave every indication that consumers and users of copper and brass were again in the market for substantial tonnages of material. I believe that during June, with other conditions remaining normal, business will be good; and that those timid buyers who have held off will again be in the market.

The demand for Monel and nickel continues strong. In fact, the situation with respect to these metals is such that deliveries are not as prompt as they might be. The unfilled orders for Monel are right at the peak, with the entire production being absorbed as quickly as turned out.

I believe there is every reason to be optimistic regarding the copper and nickel situation and that June will prove an excellent month as the demand for all kinds of products made from these materials is good and getting better.

Metal Market Review

By R. J. HOUSTON
D. Houston and Company, Metal Brokers, New York

WRITTEN ESPECIALLY FOR THE METAL INDUSTRY

COPPER

JUNE 1, 1929.

The copper market has been in a comparatively quiescent state for several weeks. There is every indication, however, that consumption is still maintained on a large scale. The movement of shipments into domestic channels and for export show this to be the case. New business was much below the average recorded earlier in the year. This condition is considered logical in view of the fact that immediate and near future home requirements are well covered. Important export buying has also been deferred. The abrupt drop in prices during April was a big factor in causing unsettlement and presenting a more lively market.

Meanwhile the market price has held up fairly steady at 18 cents per pound delivered to Connecticut Valley points and 18.30 cents c. i. f. European ports. There were rumors of slight concessions on small outside lots, but leading holders were not competing for business at cut rates. A ten per cent curtailment of productive activity has been ordered by some of the principal producing groups. There were indications that output was on expanding scale, and so several prominent companies decided on the policy of mine contraction. The result of flooding the market with a commodity far in excess of trade requirements are adverse to sound business expansion. This has been demonstrated over and over again, and the fallacy of such an operation is too apparent to call for argument.

Surplus stocks of refined on May 1 amounted to 114,988,000 pounds, being an increase of 9,052,000 pounds since April 1.

The market closed firm. With prospects of a final solution regarding the reparations problem, the outlook is for increased market activity.

ZINC

Trading was on a moderate scale and the market tone steady during May. The buying movement, however, was not strong enough to give prices a vigorous boost, and slight concessions appeared from time to time in order to send business over the top. The statistical position on May 1 showed improvement. The total shipments in April were 3,374 tons in excess of production for that month. Stocks of all grades in smelters' hands on April 30 were 34,588 tons, and compared with 45,418 tons on January 31, a reduction of 10,830 tons in the last three months. This shows a healthy tendency, although the situation is not so favorable as it might be owing to increased stocks of ore. Production is still too large for consumption and a lower rate of output is the remedy. Prime Western slab zinc quotes 6.90c. to 6.95c. New York, and 6.55c. to 6.60c. East St. Louis.

TIN

Market values for tin were on a declining scale lately. The month of May opened at 43¾c. for Straits tin, and within the first fortnight there was an advance to 44½c. on reports from London that producers would combine to stabilize prices and bring about an adjustment between output and consumption. The firmer tone soon evaporated, however, and during the second half of the month there was a gradual chipping away of prices until nearby Straits sold at 43⅜c., which was the low price for the

year. The position of tin is disturbing to an important group of British producers who claim that production has been overstimulated and profits unduly reduced. World consumption of tin shows a substantial increase over the demand two years ago. The volume of supply has also increased until the total visible supply on May 1 amounted to 26,353 tons as against 15,001 tons a year ago.

The excess output has exerted an adverse effect on the tin situation.

ALUMINUM

At a time when certain other metals have had to meet declining prices, an outstanding feature in aluminum is the ability to maintain market values on all grades at the same level month after month. There is a good outlet for production, and fabricators of the metal have been very busy. Large tonnages are going to the automotive industry. The recent growth in this line of manufacture has been a conspicuous factor in swelling the demand for aluminum. Other industries are also taking important tonnages in various forms. Consumption appears to be at an expanding rate. The latest available figures show that the stocks of aluminum in bond on April 1 were 6,303,896 pounds as against 11,229,314 pounds on March 1. Canadian exports of aluminum have increased lately, large shipments coming to the United States and going to Japan.

ANTIMONY

A fair volume of business was transacted in Chinese Antimony at slight price recessions from previous quotations. The tone was consequently softer recently for both nearby and future delivery. Buying interest was spasmodic, with a range of 8.90c. to 9c. for Chinese regulars at New York, duty paid. Sales were made at month-end at 6.90c. c. i. f. New York for June-July shipment from China. Shipments from China to the United States were in larger volume in April than those for March. Arrivals in June are therefore expected to provide the market with ample supplies.

LEAD

Large amounts of lead are steadily going into consumption, and the maintenance of a high rate of trade outlet has kept the market at the New York level of 7 cents a pound for several weeks. The East St. Louis price quotes 6.75c. to 6.80c., but slight concessions were heard of by outside holders in the Middle West. Demand for some time was for nearby shipment, but more confidence seems to have developed lately and consumers are turning their attention to future deliveries. Producers are holding firmly to present quotations. A more active buying movement is expected due to heavy third-quarter requirements which are yet to be filled. Conditions indicate constructive factors at work, and with business in nearly all lines above normal, the outlook for important activity in lead is excellent.

QUICKSILVER

Quicksilver prices vary according to sources of supply. Prices as low as $120.50 per flask have been quoted, although higher prices are also reported.

PLATINUM

Market for platinum is devoid of special interest. The refined metal is quoted at $63 to $64 per ounce. Small lots have brought higher prices.

SILVER

Conditions in silver reflects elements of weakness in the international markets of the world for this commodity. Bullion prices at the end of May showed further recessions and the New York quotation was down to 52⅞ cents per ounce, a new low since September 1927. Chinese operators were both sellers and buyers recently. India has not been active enough to give support. The tendency has been downward and the outlook uncertain.

OLD METALS

Activity in the markets for old metals was on a moderate scale part of the time during May and conspicuously quiet at other times. The recent decline in new refined copper upset the whole situation in scrap grades and placed the market in an unusually sensitive position. Expectations of some holders failed to materialize when high grade copper scrap was quoting 22c. or better. The decline found dealers with substantial supplies on hand, and certain offerings have furnished the basis for caution among buyers. Current market prices for first class copper wire are quoted at 15c. to 15¼c., with sales for export at 15¼c. alongside of steamer. Foreign buyers have displayed renewed interest in shipments from this side. Domestic refineries are also actively interested when prices are satisfactory. Prices dealers offer to pay are 15c. to 15¼c. for selected crucible copper, 11¾c. to 12c. for light copper, 7¾c. to 8c. for heavy brass, 11c. to 11¼c. for new brass clippings, 4½c. to 4¾c. for heavy lead, 4¼c. to 4½c. for new zinc scrap, and 17¼c. to 18c. for aluminum clippings.

Daily Metal Prices for the Month of May, 1929

Record of Daily, Highest, Lowest and Average Prices and the Customs Duties

	1	2	3	6	7	8	9	10	12	14	15	16	17
Copper c/lb. Duty Free													
Lake (Del.)	18.125	18.125	18.125	18.125	18.125	18.125	18.125	18.125	18.125	18.125	18.125	18.125	18.125
Electrolytic (f. a. s. N. Y.)	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	17.75	18.00
Casting (f. o. b. N. Y.)	17.625	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.25
Zinc (f. o. b. St. L.) c/lb. Duty 1¼c/lb.													
Prime Western	6.60	6.60	6.60	6.55	6.55	6.55	6.55	6.55	6.55	6.55	6.575	6.60	6.55
Brass Special	6.80	6.75	6.75	6.75	6.75	6.70	6.70	6.70	6.70	6.70	6.70	6.70	6.65
Tin (f. o. b. N. Y.) c/lb. Duty Free													
Straits	43.875	43.875	43.875	44	44	44.375	44.50	44.625	44.25	44.125	44.25	43.95	43.75
Pig 99%	43.125	43.125	43.125	43.15	43.25	43.625	43.75	43.875	43.50	43.375	43.50	43.25	43.00
Lead (f. o. b. St. L.) c/lb. Duty 2½c/lb.	6.80	6.80	6.80	6.80	6.80	6.80	6.80	6.80	6.80	6.80	6.80	6.80	6.80
Aluminum c/lb Duty 5c/lb.	24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30
Nickel c/lb. Duty 3c/lb.													
Ingot	35	35	35	35	35	35	35	35	35	35	35	35	35
Shot	36	36	36	36	36	36	36	36	36	36	36	36	36
Electrolytic	35	35	35	35	35	35	35	35	35	35	35	35	35
Antimony (J. & Ch) c/lb. Duty 2c/lb.	9.125	9.125	9.125	9.00	9.00	9.00	9.00	9.00	9.00	8.875	8.875	8.875	8.875
Silver ¢/oz. Troy Duty Free	54.75	54.75	54.75	54.875	55	54.50	54.625	54.75	54.375	54.375	54.375	54.125	54
Platinum $/oz. Troy Duty Free	65	65	65	65	65	65	65	65	65	65	65	65	65

	20	21	22	23	24	27	28	29	30*	31	High	Low	Aver.
Copper c/lb. Duty Free													
Lake (Del.)	18.125	18.125	18.125	18.125	18.125	18.125	18.125	18.125	.....	18.125	18.125	18.125	18.125
Electrolytic (f. a. s. N. Y.)	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	.....	18.00	18.00	17.75	17.989
Casting (f. o. b. N. Y.)	17.25	17.25	17.25	17.25	17.25	17.25	17.25	17.25	.....	17.25	17.625	17.25	17.392
Zinc (f. o. b. St. L.) c/lb. Duty 1¼c/lb.													
Prime Western	6.55	6.55	6.60	6.60	6.60	6.60	6.60	6.60	.....	6.55	6.60	6.55	6.574
Brass Special	6.70	6.70	6.70	6.70	6.70	6.70	6.70	6.70	.....	6.70	6.80	6.65	6.711
Tin (f. o. b. N. Y.) c/lb. Duty Free													
Straits	44.00	43.75	43.80	43.65	43.75	43.50	43.375	43.50	.....	43.375	44.625	43.375	43.916
Pig 99%	43.25	43.00	43.00	42.75	42.875	42.75	42.75	42.875	.....	42.75	43.875	42.75	43.166
Lead (f. o. b. St. L.) c/lb. Duty 2½c/lb.	6.80	6.80	6.80	6.80	6.80	6.80	6.80	6.80	.....	6.80	6.80	6.80	6.80
Aluminum c/lb Duty 5c/lb.	24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30	.....	24.30	24.30	24.30	24.30
Nickel c/lb. Duty 3c/lb.													
Ingot	35	35	35	35	35	35	35	35	.....	35	35	35	35
Shot	36	36	36	36	36	36	36	36	.....	36	36	36	36
Electrolytic	35	35	35	35	35	35	35	35	.....	35	35	35	35
Antimony (J. & Ch) c/lb. Duty 2c/lb.	8.875	9.00	9.00	9.00	9.00	9.00	9.00	9	.....	9	9.125	8.875	8.989
Silver c/oz. Troy Duty Free	53.75	53.875	53.875	53.375	53.625	53.625	53.125	53.25	.....	52.875	55.00	52.875	54.119
Platinum $/oz. Troy Duty Free	65	65	65	65	65	64	64	64	.....	64	65	64	64.818

*Holiday.

Metal Prices, June 10, 1929

NEW METALS

Copper: Lake, 18.125. Electrolytic, 18.00. Casting, 17.25.
Zinc: Prime Western, 6.60. Brass Special, 6.70.
Tin: Straits, 44.75. Pig, 99%, 44.375.
Lead: 6.80. **Aluminum,** 24.30. **Antimony,** 9.00.
Nickel: Ingot, 35. Shot, 36. Elec., 35. Pellets, 40.
Quicksilver: flask, 75 lbs., $121. **Bismuth,** $1.70.
Cadmium, 95. **Cobalt,** 97%, $2.60. **Silver,** oz., Troy, 52.375.
Gold: oz., Troy, $20.67. **Platinum,** oz., Troy, $64.00.

INGOT METALS AND ALLOYS

Brass Ingots, Yellow	13½to14½
Brass Ingots, Red	16¼to17¼
Bronze Ingots	17¼
Casting Aluminum Alloys	21 to24
Manganese Bronze Castings	28 to40
Manganese Bronze Ingots	16 to21
Manganese Bronze Forging	36 to44
Manganese Copper, 30%	30 to40
Monel Metal Shot	28
Monel Metal Blocks	28
Parsons Manganese Bronze Ingots	16½to19¾
Phosphor Bronze	19 to22
Phosphor Copper, guaranteed 15%	22½to25
Phosphor Copper, guaranteed 10%	21½to24
Phosphor Tin, no guarantee	55 to70
Silicon Copper, 10%, according to quantity	30 to35

OLD METALS

Buying Prices		Selling Prices
14¼to14¾	Heavy Cut Copper	15¼to15¾
13½to14	Copper Wire, mixed	14½to15
12 to12½	Light Copper	13 to13½
11½to12	Heavy Machine Composition	12½to13
8¼to 8¾	Heavy Brass	9¼to 9¾
6¾to 7¼	Light Brass	7¾to 8¼
8¾to 9¼	No. 1 Yellow Brass Turnings	9¾to10¼
11½to12	No. 1 Composition Turnings	12½to13
5⅜to 5⅝	Heavy Lead	6⅛to 6⅜
3¼to 4¾	Zinc Scrap	4¼to 5¾
8 to 8½	Scrap Aluminum Turnings	12 to12½
12 to12¼	Scrap Aluminum, cast alloyed	16 to16¼
17½to18½	Scrap Aluminum sheet (new)	20½to21½
27 to29	No. 1 Pewter	32 to35
20 to21	Old Nickel Anodes	22 to23
20 to23	Old Nickel	22 to25

Wrought Metals and Alloys

COPPER SHEET

Mill shipment (hot rolled) .....27¾c. to 28¾c. net base
From Stock .....28¾c. to 29¾c. net base

BARE COPPER WIRE

19⅝c. to 19⅞c. net base, in carload lots.

COPPER SEAMLESS TUBING

29¼c. to 30¼c., net base.

SOLDERING COPPERS

300 lbs. and over in one order .....26¼c. net base
100 lbs. to 200 lbs. in one order .....26¾c. net base

ZINC SHEET

Duty sheet, 2c., per pound — Cents per lb.
Carload lots, standard sizes and gauges, at mill, less 8 per cent discount .....10.25 net base
Casks, jobbers' price .....10.50 net base
Open casks, jobbers' price .....11to11.50 net base

ALUMINUM SHEET AND COIL

Aluminum sheet, 18 gr., base price, ton lots.....33.30c.
Aluminum coils, 24 ga., base price, ton lots.....31.00c.

ROLLED NICKEL SHEET AND ROD

Net Base Prices

Cold Drawn Rods	53c.	Cold Rolled Sheet	60c.
Hot Rolled Rods	45c.	Full Finished Sheet	52c.

BLOCK TIN SHEET

Block Tin Sheet—18" wide or less. No. 26 B. & S. Gauge or thicker, 100 lbs. or more 10½c. over Pig Tin; 50 to 100 lbs., 15c. over; 25 to 50 lbs., 17c. over; less than 25 lbs., 25c. over.

SILVER SHEET

Rolled sterling silver 54½c. to 56½c. per ounce, Troy.

BRASS MATERIAL—MILL SHIPMENTS

In effect April 16, 1929
To customers who buy 5,000 lbs. or more in one order.

	Net base per lb. High Brass	Low Brass	Bronze
Sheet	$0.23¼	$0.25	$0.26¼
Wire	.23¾	.25½	.26¾
Rod	.21¼	.25¾	.27
Brazed tubing	.30⅞	....	.35⅞
Open seam tubing	.31¼	....	.34¼
Angles and channels	.31¼	....	.34¼

BRASS SEAMLESS TUBING

28¼c. to 29¼c. net base.

TOBIN BRONZE AND MUNTZ METAL

Tobin Bronze Rod	25¾c. net base
Muntz or Yellow Metal Sheathing (14"x48")	24c. net base
Muntz or Yellow Rectangular sheet other Sheathing	25c. net base
Muntz or Yellow Metal Rod	22¼c. net base

Above are for 100 lbs. or more in one order.

NICKEL SILVER (NICKELENE)

Net Base Prices

Grade "A" Sheet Metal		Wire and Rod	
10% Quality	31⅜c.	10% Quality	34⅛c.
15% Quality	33c.	15% Quality	37¾c.
18% Quality	34¼c.	18% Quality	41c.

MONEL METAL, SHEET AND ROD

Hot Rolled Rods (base)	35	Full Finished Sheets (base)	42
Cold Drawn Rods (base)	40	Cold Rolled Sheets (base)	50

BRITANNIA METAL SHEET

No. 1 Britannia—18" wide or less, No. 26 B. & S. Gauge or thicker, 500 lbs. or over, 8c. over N. Y. tin price; 100 lbs. to 500 lbs., 10c. over; 50 to 100 lbs., 15c. over; 25 to 50 lbs., 20c. over; less than 25 lbs. 25c. over. Prices f. o. b. mill.

Supply Prices, June 10, 1929

ANODES

Copper: Cast	28c.	per lb.	
Rolled, oval	27c.	per lb.	
Rolled, sheets, trimmed	27¾c.	per lb.	
Brass: Cast	27c.	per lb.	
Zinc: Cast	12½c.	per lb.	

Nickel: 90-92%	45c.	per lb.
95-97%	47c.	per lb.
99%	49c.	per lb.

Silver: Rolled silver anodes .999 fine are quoted from 56c., to 58c., Troy ounce, depending upon quantity.

FELT POLISHING WHEELS WHITE SPANISH

Diameter	Thickness	Under 100 lbs.	100 to 200 lbs.	Over 200 lbs.
10-12-14 & 16"	1" to 3"	$3.00/lb.	$2.75/lb.	$2.65/lb.
6-8 & Over 16	1 to 3	3.10	2.85	2.75
6 to 24	Under ½	4.25	4.00	3.90
6 to 24	½ to 1	4.00	3.75	3.65
6 to 24	Over 3	3.40	3.15	3.05
4 up to 6	¼ to 3	4.85	4.85	4.85
4 up to 6	Over 3	5.25	5.25	5.25
Under 4	¼ to 3	5.45	5.45	5.45
Under 4	Over 3	5.85	5.85	5.85

Grey Mexican Wheel deduct 10c per lb. from White Spanish prices.

COTTON BUFFS

Full Disc Open buffs, per 100 sections.

12" 20 ply 64/68 Unbleached	$27.99to$29.00
14" 20 ply 64/68 Unbleached	36.81to 37.65
12" 20 ply 80/92 Unbleached	31.25to 34.16
14" 20 ply 80/92 Unbleached	42.40to 46.09
12" 20 ply 84/92 Unbleached	36.60to 42.90
14" 20 ply 84/92 Unbleached	49.60to 57.60
12" 20 ply 80/84 Unbleached	38.35to 39.37
14" 20 ply 80/84 Unbleached	52.00to 53.12

Sewed Pieced Buffs, per lb., bleached ..... 40c. to 73c.

CHEMICALS

These are manufacturers' quantity prices and based on delivery from New York City.

Acetone	lb.	.14-.19
Acid—Boric (Boracic) Crystals	lb.	.08½
Chromic, 75 and 125 lb. drums	lb.	.20½-.21
Hydrochloric (Muriatic) Tech., 20°, Carboys	lb.	.02
Hydrochloric, C. P., 20 deg., carboys	lb.	.06
Hydrofluoric, 30%, bbls.	lb.	.08
Nitric, 36 deg., carboys	lb.	.06
Nitric, 42 deg., carboys	lb.	.07
Sulphuric, 66 deg., carboys	lb.	.02
Alcohol—Butyl	lb.	.16¾-.21¼
Denatured, drums	gal.	.45-.57
Alum—Lump, Barrels	lb.	.03¼
Powdered, Barrels	lb.	.039
Aluminum sulphate, commercial tech	lb.	3.3
Aluminum chloride, solution in carboys	lb.	.06½
Aluminum—Sulphate, tech., bbls.	lb.	.33
Sulhpocyanide	lb.	.65
Arsenic, white, kegs	lb.	.05
Asphaltum	lb.	.35
Benzol, pure	gal.	.60
Borax Crystals (Sodium Biborate), bbls.	lb.	.04½
Calcium Carbonate (Precipitated Chalk)	lb.	.04
Carbon Bisulphide, Drums	lb.	.06
Chrome Green, bbls.	lb.	.25
Chromic Sulphate	lb.	.30
Copper—Acetate (Verdigris)	lb.	.23
Carbonate, bbls.	lb.	.21½
Cyanide (100 lb. kgs)	lb.	.50
Sulphate, bbls.	lb.	6.7
Cream of Tartar Crystals (Potassium Bitartrate)	lb.	.27
Crocus	lb.	.15
Dextrin	lb.	.05-.08
Emery Flour	lb.	.06
Flint, powdered	ton	$30.00
Fluor-spar (Calcic fluoride)	ton	$70.00
Fusel Oil	gal.	$4.45
Gold Chloride	oz.	$14.00
Gum—Sandarac	lb.	.26
Shellac	lb.	.59-.61
Iron Sulphate (Copperas), bbl.	lb.	.01½
Lead Acetate (Sugar of Lead)	lb.	.13¼
Yellow Oxide (Litharge)	lb.	.12½
Mercury Bichloride (Corrosive Sublimate)	lb.	$1.58
Nickel—Carbonate, dry bbls.	lb.	.35
Chloride, bbls.	lb.	.20
Salts, single, 300 lb. bbls.	lb.	.13
Salts, double, 425 lb. bbls.	lb.	.13
Paraffin	lb.	.05-.06
Phosphorus—Duty free, according to quantity	lb.	.35-.40
Potash, Caustic Electrolytic 88-92% broken, drums	lb.	.09
Potassium Bichromate, casks (crystals)	lb.	.09¼
Carbonate, 96-98%	lb.	.06¾-.07
Cyanide, 165 lb. cases, 94-96%	lb.	.57½
Pumice, ground, bbls.	lb.	.02½
Quartz, powdered	ton	$30.00
Rosin, bbls.	lb.	.04½
Rouge, nickel, 100 lb. lots	lb.	.25
Silver and Gold	lb.	.65
Sal Ammoniac (Ammonium Chloride) in casks	lb.	.05½
Silver Chloride, dry, 100 oz. lots	oz.	.45
Cyanide (fluctuating)	oz.	.55-.57½
Nitrate, 100 ounce lots	oz.	.39
Soda Ash, 58%, bbls.	lb.	.02½
Sodium—Cyanide, 96 to 98%, 100 lbs.	lb.	.18
Hyposulphite, kegs	lb.	.04
Nitrate, tech., bbls.	lb.	.04¾
Phosphate, tech., bbls.	lb.	.03¾
Silicate (Water Glass), bbls.	lb.	.02
Sulpho Cyanide	lb.	.32½
Sulphur (Brimstone), bbls.	lb.	.02
Tin Chloride, 100 lb. kegs	lb.	.35
Tripoli, Powdered	lb.	.03
Wax—Bees, white, ref. bleached	lb.	.60
Yellow, No. 1	lb.	.45
Whiting, Bolted	lb.	.02½-.06
Zinc, Carbonate, bbls.	lb.	.11
Chloride, casks	lb.	.06¾
Cyanide (100 lb. kegs)	lb.	.41
Sulphate, bbls.	lb.	.03¾